INTRODUCTION TO MANPAD (16S) STINGER

SUBCOURSE NO. AD 0575

US Army Air Defense Artillery School Fort Bliss, Texas

Eight Credit Hours

GENERAL

This subcourse is designed to teach the knowledge necessary for performing tasks related to a man-portable air defense (MANPAD) crew member. Information is provided on tactical equipment, handling and firing the Stinger weapon, aircraft detection and engagement procedures, Stinger crew operations, and forward area alerting radar (FAAR)/target alert data display system (TADDS). Information is also provided on relations with supported units, mobility and combat loading, system support capabilities, Stinger training concepts, and moving target simulator (MTS) training. The subcourse is presented in three lessons; each lesson corresponds to a terminal objective.

Lesson 1: INTRODUCTION TO MANPAD (16S) STINGER

TASK: Describe the tactical equipment used with the Stinger weapon system and procedures used to handle and fire the weapon.

CONDITIONS: Given information about all tactical equipment used with the Stinger weapon system, the handling procedures for the Stinger weapon system, and the procedures for readying the Stinger weapon for firing.

STANDARDS: Demonstrate competency of skill and knowledge by responding to the multiple-choice test covering procedures for handling and firing the Stinger weapon.

Lesson 2: MANPAD CREW OPERATIONS

TASK: Describe the methods for detecting, interrogating, identifying, and engaging aircraft. Describe Stinger crew operations.

CONDITIONS: Given information on the methods of aircraft detection and Stinger crew operations.

STANDARDS: Demonstrate competency of skill and knowledge by responding to the multiple-choice test covering methods of aircraft detection and crew operations.

(This objective supports SM Tasks 441-066-3021, 441-066-3024, 441-066-3026, 441-066-3028, 441-066-3032, 441-066-3036, 441-066-3040.)

Lesson 3: STINGER TRAINING AND TRAINING DEVICES

TASK: Describe Stinger training concepts and MTS training.

CONDITIONS: Given information on the concepts of Stinger training and MTS training.

STANDARDS: Demonstrate competency of skill and knowledge by responding to the multiple-choice test covering concepts on Stinger training and MTS training.

Unless otherwise stated, whenever masculine gender is used, both men and women are included.

ADMINISTRATIVE INSTRUCTIONS

SUBCOURSE CONTENT

This subcourse contains three lessons and an examination. It is designed to familiarize you with the operations of MANPAD Stinger.

Supplementary Requirements

There are no supplementary requirements for this subcourse.

Supervisory Assistance. There are no supervisory requirements for completion of this subcourse.

References. No supplementary references are needed for this subcourse.

GRADING AND CERTIFICATION INSTRUCTIONS

INSTRUCTIONS TO THE STUDENT

Eight credit hours will be awarded for successful completion of the subcourse.

TABLE OF CONTENTS

LESSON 1 INTRODUCTION TO MANPAD (16S) STINGER

TASK

Describe the tactical equipment used with the Stinger weapon system and procedures used to handle and fire the weapon.

CONDITIONS

Given information about all tactical equipment used with the Stinger weapon system, the handling procedures for the Stinger weapon system, and the procedures for readying the Stinger weapon for firing.

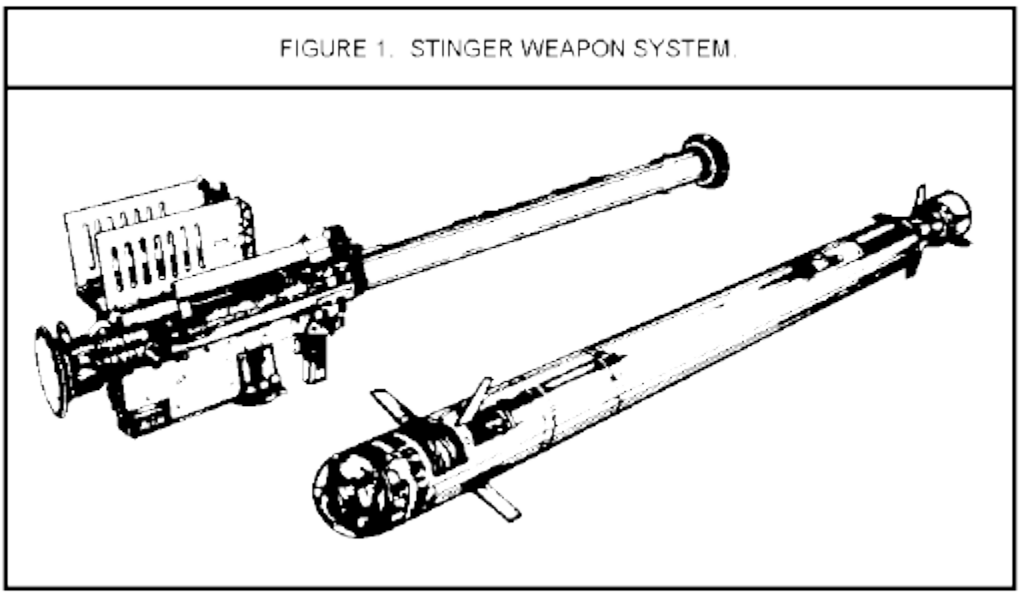
STANDARDS

Demonstrate competency of skill and knowledge by responding to the multiple-choice test covering procedures for handling and firing the Stinger weapon.

Learning Event 1: GENERAL

Stinger is a man-portable, shoulder-fired, infrared homing (heat-seeking) guided missile system. Stinger provides air defense to combat arms battalions and selected combat support units. Stinger is designed to counter high-speed, low-level, ground attack aircraft. Also, it is lethal weapon against helicopter, observation, and transport aircraft (Figure 1).

FIGURE 1. STINGER WEAPON SYSTEM.



STINGER ACCEPTANCE

The Army has accepted delivery of the first Stinger air defense weapon to come off the manufacturer's pilot production line. The Stinger will give the US Army and Marines immediate air defense against low-level aircraft attacking from any direction. The Stinger has improved range and maneuverability, is resistant to countermeasures, and has a device to assist the gunner in identification of aircraft. Initial units will be tested at White Sands Missile Range, New Mexico, by the Army Missile Command.

MISSION

Stinger will provide combat/combat support units with their own capability to destroy hostile aircraft attacking at low altitudes. It is an infrared homing guided missile system capable of engaging a wide variety of aerial targets,including jets and propeller-driven aircraft, helicopters, and remotely piloted vehicles.

WEAPONS SYSTEM DESCRIPTION

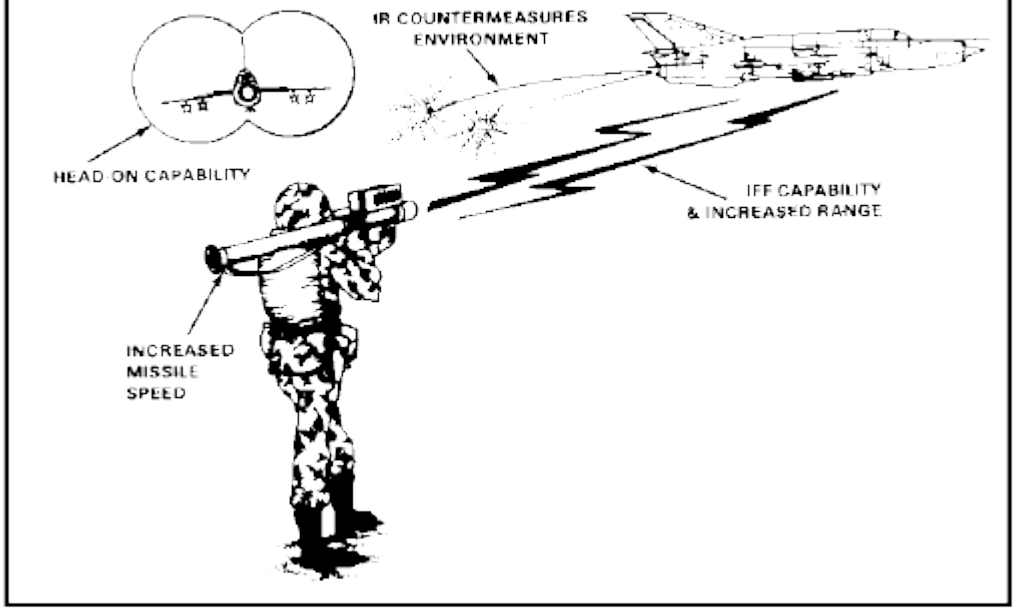
Stinger will normally be employed to provide low-altitude air defense for company-size units operating on or near the forward line of troops (FLOT). It can be employed to provide or supplement the air defense for missile sites and other critical assets. Stinger will also be useful in the early tactical phases of airmobile or airborne operations.

ADVANTAGES OVER THE REDEYE WEAPON SYSTEM

Stinger weapon system will provide the following advantages over Redeye (Figure 2).

- Increased missile speed.
- Increased capability in an infrared countermeasures environment.
- Means for identification of friendly aircraft.
- Increased range.

FIGURE 2. STINGER ADVANTAGES OVER REDEYE.

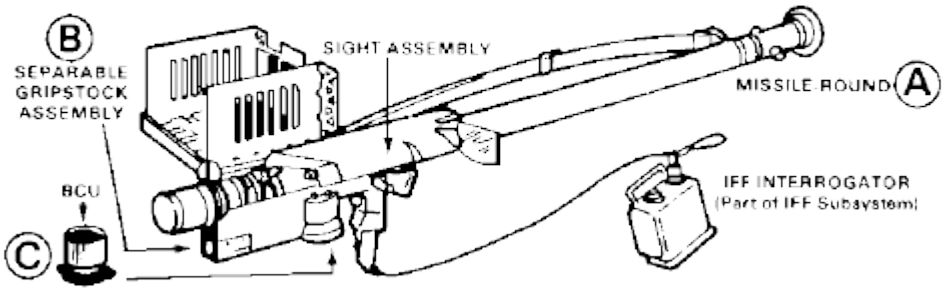


Learning Event 2: TACTICAL EQUIPMENT

The Stinger weapon-round is made up of a missile-round (A) mated to a separable gripstock assembly (B). A battery/coolant unit (BCU) (C) is also required to fire the missile. You must have all three items

to have an operational weapon. The weapon is 60 inches long and, with BCU inserted, weighs 34.7 pounds. When the identification, friend or foe (IFF), interrogator is used with the weapon, it helps identify friendly aircraft. To have this capability, you must connect the interrogator to the weapon, with its interconnecting cable (Figure 3).

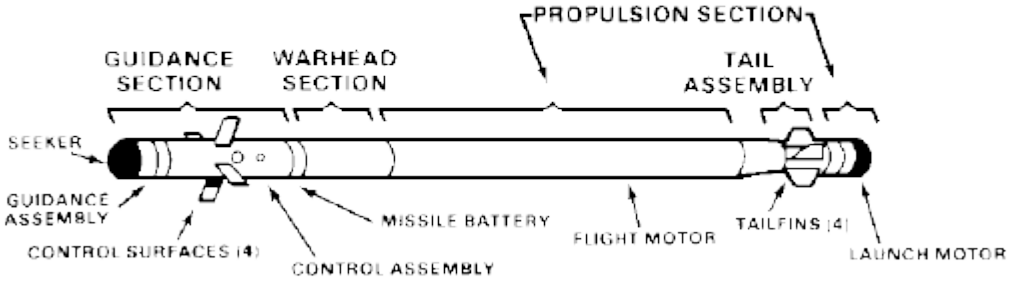
FIGURE 3. STINGER WEAPON-ROUND.



STINGER MISSILE

The Stinger missile is a rocket-propelled, heat-seeking missile. The missile is housed in the launch tube. Major components that make up the missile are shown in Figure 4.

FIGURE 4. STINGER MISSILE.



Guidance Section

The guidance section consists of a guidance assembly, control assembly, a missile battery, and four control surfaces. The guidance assembly processes target infrared (IR) energy and provides guidance commands for the missile during flight. The seeker tracks the IR source automatically after the gyro is uncaged and during missile flight. The control assembly converts the guidance commands into movement of control surfaces which direct the flight of the missile. The missile battery provides the inflight power for the Stinger guided missile.

Warhead Section

The warhead section consists of a fuze assembly and a quantity of explosives, all within a cylindrical case. After the flight motor ignites, the fuze arms the warhead. The fuze can detonate the warhead in two ways: by means of a target impact switch or by a hard target sensor. Should target intercept not occur within 15-19 seconds after launch, a self-destruct circuit initiates warhead detonation. Safety features are included to ensure that the missile is safe for shipping and handling.

Propulsion Section

Propulsion for the missile is developed by a separable launch motor and a dual thrust flight motor. The launch (eject) motor provides initial thrust that ejects the missile from the launch tube. It allows the missile to coast a safe distance (about 9 meters/29 feet) from the gunner prior to ignition of the flight motor. The launch motor is expended and separated from the flight motor before the missile is out of the launch tube. The expended launch motor drops from the missile outside the launch tube at a safe distance from the gunner. Also, at separation, a lanyard attached to the launch motor pulls the shorting plug from the flight motor ignition circuit.

The flight motor provides propulsion for the missile during the flight. The flight motor fires after the missile coasts for a safe distance from the gunner. Thrust for the flight motor is provided in two phases: boost and sustain. Initially, both burn simultaneously. The boost phase rapidly accelerates the missile to its top speed. The boost phase ends, but the sustain phase continues. The sustain phase maintains the missile speed for a time sufficient to complete the mission.

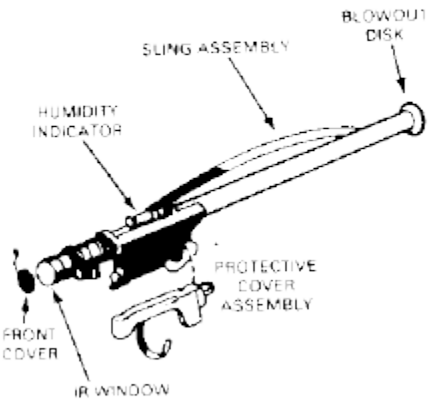
Tail Assembly

The tail assembly consists of four holding tail fins that provide roll and missile stability. Within the launch tube, the fins are in a folded position. As the missile leaves the launch tube, they are ejected by spring action and by the force generated by missile spin, and then locked into place.

STINGER LAUNCHER

The fiberglass tube is the main support for all other parts of the launcher. Both ends of the launch tube are sealed with breakable disks. The IR window (front disk) is transparent to IR radiation. Both the IR window and the blowout disk (rear) break when the missile is fired. A desiccant cartridge/humidity indicator on the launch tube indicates whether moisture has entered the tube. The sight assembly is attached to the launch tube with two hinges (Figure 5).

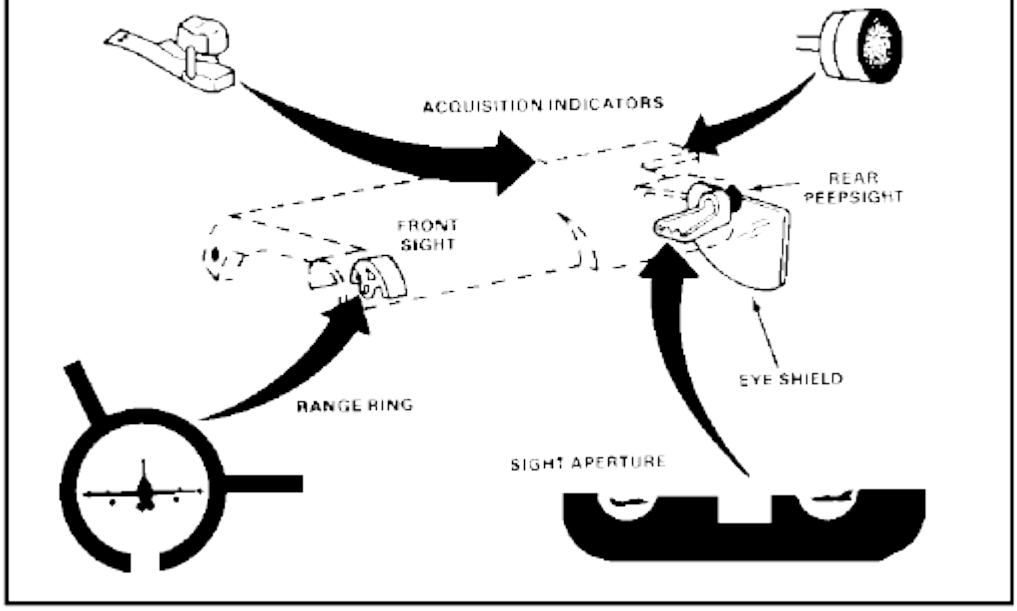
FIGURE 5. LAUNCH TUBE ASSEMBLY.



SIGHT ASSEMBLY

The sight which is used for aiming the weapon and visually tracking the target, has apertures for insertion of lead and superelevation. Two acquisition indicators are mounted on the sight assembly. One is a small speaker and the other is a small unit which vibrates against the cheekbone. These indicators provide an IFF tone response and an IR tone. These indicators allow you to both hear and feel the IFF tone and IR acquisition signal. Also attached to the sight is a clear plastic eye shield to protect the gunner's left eye when the weapon is fired (Figure 6). The open sight of the Stinger weapon consists of a front sight with range ring, a sighting aperture with three open reticles, and a rear peepsight. The range is used by the gunner to determine if the aircraft is in range and also to visually track it. The rear sight ring provides for insertion of superelevation and lead. Superelevation is an additional elevation angle which corrects for the effects of gravity on the missile. Lead is applied to assist the missile on its flight path to the target. Lead is applied to all targets except directly incoming or outgoing fixed-wing aircraft. The peepsight is located at the rear of the sight and is used by the gunner to properly align the other elements of the sight.

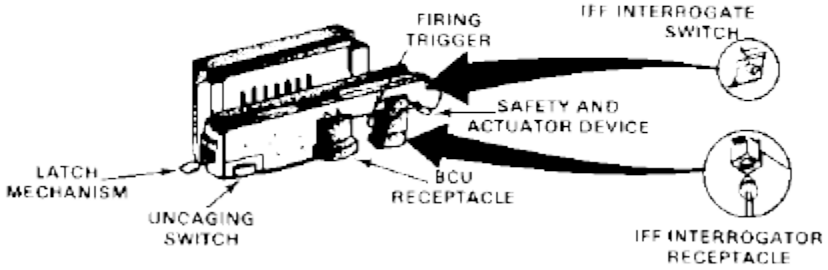
FIGURE 6. SIGHT ASSEMBLY.



SEPARABLE GRIPSTOCK ASSEMBLY

The gripstock contains all the necessary circuits and assemblies that allow the gunner to prepare and launch the missile. The gripstock is attached to and removed from the launch tube by means of a latch. Located on the gripstock assembly are the safety and actuator device, uncaging switch, firing trigger, IFF challenge switch, IFF interrogator connector, and BCU receptacle (Figure 7).

FIGURE 7. SEPARABLE GRIPSTOCK ASSEMBLY.



ANTENNA ASSEMBLY

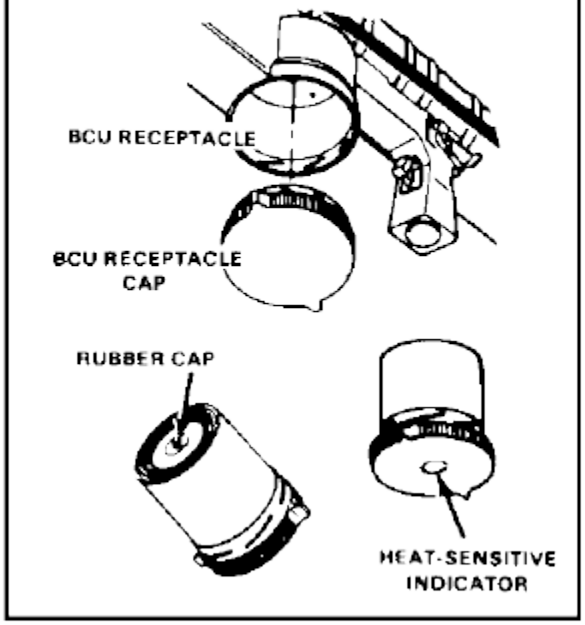
The antenna assembly folds on the right side of the gripstock when not in use. When it is unfolded and the interrogator is connected to the weapon, it is capable of interrogating aircraft and receiving coded

replies. After a missile is fired, the separable gripstock is removed from the launch tube assembly for reuse. The separable gripstock assembly can be reused until failure (Figure 7).

BATTERY COOLANT UNIT (BCU)

A BCU is used to energize the weapon's electrical circuits and to cool the IR detector in the missile seeker prior to launch. The BCU contains a battery and pressurized argon gas coolant. The BCU is activated when the safety and actuator device on the gripstock is pressed forward. Once activated, the BCU supplies electrical power and seeker coolant to the weapon for at least 45 seconds or until missile launch. The BCU is not reusable after it is activated. Three BCUs are supplied with each weapon-round and missile-round (Figure 8).

FIGURE 8. BCU COMPONENTS.



Caution

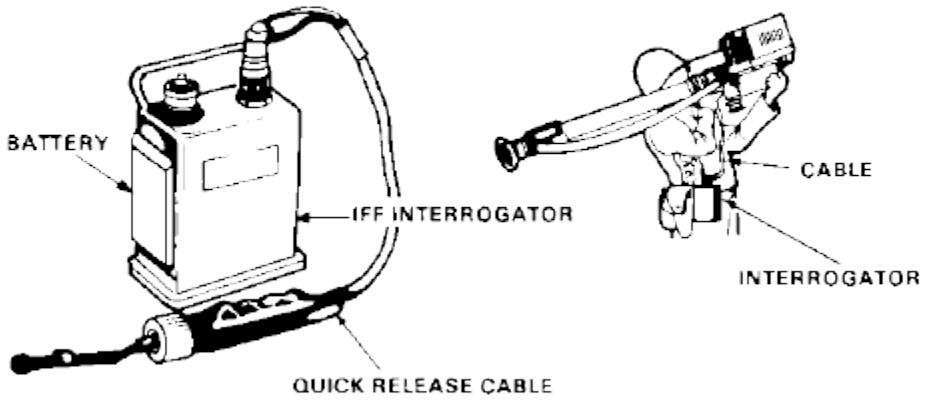
Do not discard the used BCU into dry brush, grass, or near flammable material as it is extremely hot. Handle the BCU only by the plastic cap.

IFF INTERROGATOR

The IFF interrogator is a battery-powered unit that is attached to your belt. It contains IFF system electronics. The interrogator is connected to the weapon by a quick- release, plug-in cable. When not in use, the IFF interrogator, with its cable attached, is stored in the interrogator shipping and storage container. The interrogator weighs about 6 pounds and is programmed with an interrogation code. It can be programmed to operate in mode 4 secure code for four days. Within four days, a new or recharged battery must be installed and the unit reprogrammed. Unless it is reprogrammed, the system automatically shifts from mode 4 to mode 3. It remains in this mode of operation until the batteries are

discharged or the system is reprogrammed. Arrangements for IFF battery replacement and reprogramming (such as date, time, and location) are made by the section chief and are based on the tactical situation (Figure 9).

FIGURE 9. IFF INTERROGATOR.

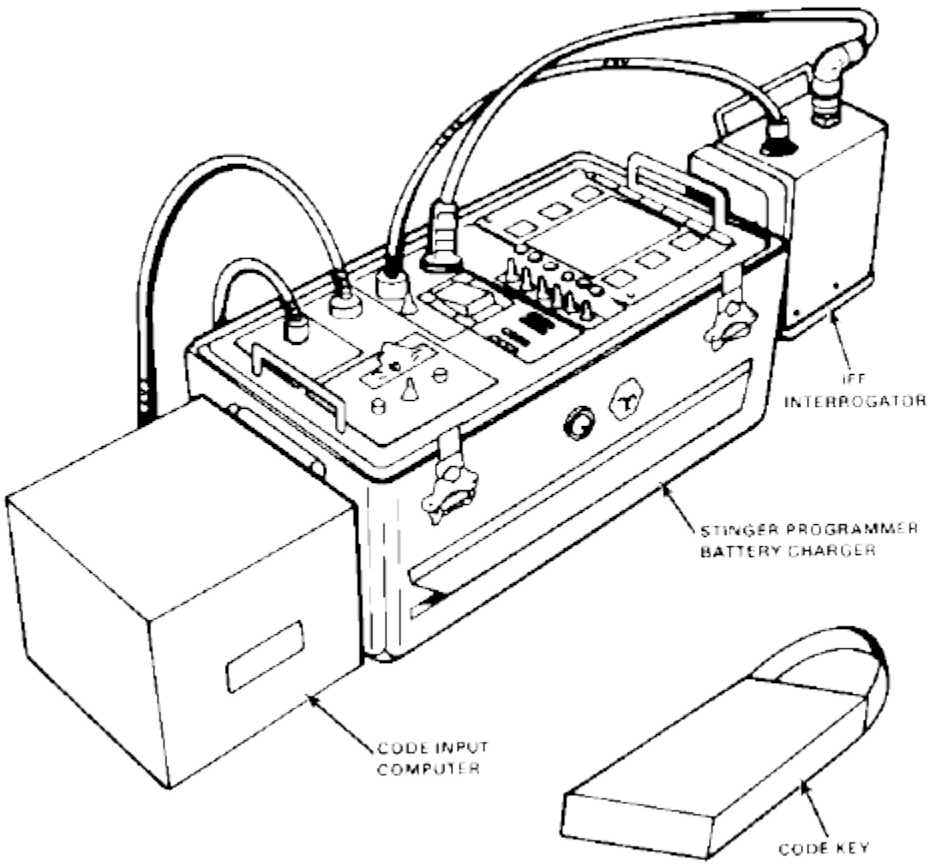


OTHER IFF SUBSYSTEM EQUIPMENT

Programmer/Battery Charger

The purpose of the programmer/battery charger is to program the IFF interrogator with 4 codes and to charge the battery. This equipment is located at the section headquarters. The code input computer and code keys are required to program the mode 4 codes into the interrogator. The keys are used to insert the proper code into the computer. The computer inserts the data into the interrogator through the programmer. The battery charger will charge from one to six batteries. Operating instructions are found in TM 9-1425-429-12 (Figure 10).

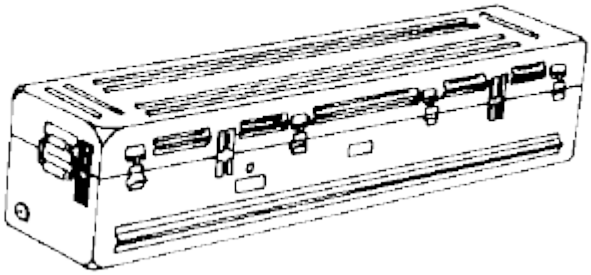
FIGURE 10. PROGRAMMER/BATTERY CHARGER.



Weapon-Round Shipping and Storage Container (WRC)

This container is an aluminum box which provides environmental protection for one weapon-round and three BCUs during shipping and storage. It also contains one set of ear plugs. It is equipped with four latches, handles for two- man carry, a pressure relief valve, humidity indicator, and BCU storage area. Four of these containers, with weapons, are issued to each team as part of its basic load. The containers and gripstocks will be reused with missile-rounds once the weapon-round is expended (Figure 11).

FIGURE 11. WEAPON-ROUND SHIPPING AND STORAGE CONTAINER (WRC).



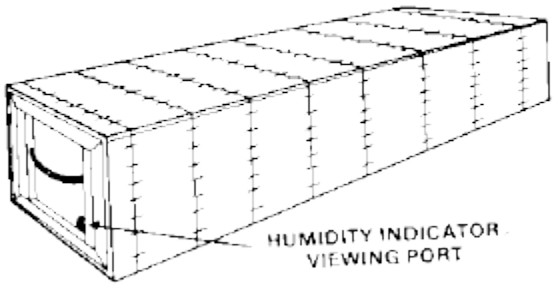
Ready Rack Configuration

A container is converted to a ready rack by releasing the latches which make the weapon-round, with BCU inserted, readily accessible. When used as a ready rack, the closed container provides limited environmental protection for the weapon-round with BCU installed. The ready rack setup helps provide the capability for a gunner to open the container and remove and shoulder the weapon within 10 seconds.

Missile-Round Shipping and Storage Containers (MRC)

This container is a wooden box which provides adequate protection for one missile-round and three BCUs during shipping and storage. It also contains one set of ear plugs. The missile-round and three BCUs are wrapped in a sealed barrier bag with desiccant for protection against the environment. A humidity indicator is enclosed in the bag to indicate moisture content. The sides of the box are wire bound. Two of these boxes containing missile-round are issued to each team as the remaining part of their basic load. As rounds are expended, the gunner simply opens an MRC, removes the missile-round, mates the gripstock of the expended round to the new missile-round, and inserts a BCU. He then has a complete weapon-round to use if needed. Empty MRCs are kept to maintain the stability of the containers in the trailer until resupply. At this time, the empty containers are replaced with full containers (Figure 12).

FIGURE 12. MISSILE-ROUND SHIPPING AND STORAGE CONTAINER (MRC)



IFF Interrogator Container

This reuseable fiberglass container stores the IFF interrogator, battery, and interconnecting cable. The container is not pressurized, but it does contain a pressure relief valve to release pressure build up within the container (Figure 13).

FIGURE 13. IFF INTERROGATOR CONTAINER.

Transport Harness

The four weapon-round and two MRCs are secured within the M416 1/4-ton trailer by a nylon webbing assembly called a transport harness. A strap runs lengthwise over the center of the 1/4-ton cargo trailer and fastens to either end of the trailer by snap fasteners. From this strap, four other straps lead, two to each side, through quick-release buckles to the sides of the trailer. The quick-release buckles allow immediate access to the weapons. Another strap runs completely around the outside of the top three containers.

Alert Warning System-FAAR/TADDS

A Stinger crew may be warned of an approaching aircraft or it may visually detect the target without prior warning. Warning of the approach of an aircraft increases the chances of successfully engaging it. An alert warning will usually give the general location and heading of the aircraft and a tentative identification. The FAAR/TADDS system is the primary means of providing alerting information to the Stinger crews. This information is transmitted by radio frequency data link (RFDL) to TADDS receivers located with the Stinger crews.

FAAR System. The FAAR system is a complete, self-contained, highly mobile radar system. It provides early warning in the form of general target location in terms of distance and direction. It also provides identification in terms of friend or unknown for each target displayed. The RFDL system

provides a data communications link from the FAAR to the TADDS at the Stinger positions. The FAAR has an additional capability of passing voice radio transmissions.

TADDS. The TADDS is a lightweight receiver which receives alert information sent from a FAAR. It must be emphasized that the TADDS is used exclusively as an FM receiver to receive early warning information from the FAAR. For the best reception, a site for the TADDS is selected which allows as close to a clear line of sight to the FAAR as possible. The key characteristic of a signal, when heard from the speaker, indicates that data link signals, not interference, are being received. Emplacement of the TADDS is quickly accomplished by one man. The operator performs the operational checks listed in TM 9-1430-589-12 to ensure proper operation.

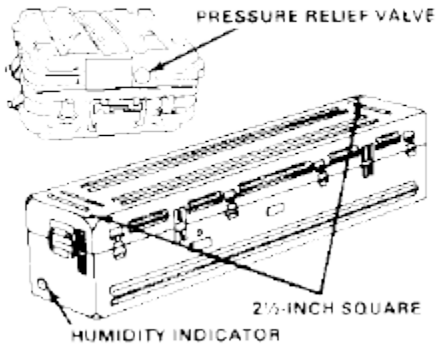
Note: An explanation on the complete use of TADDS will be discussed later in this subcourse.

Learning Event 3: HANDLING PROCEDURES

Upon receipt of a Stinger weapon from the ammunition supply point (ASP), it must be checked to be sure it is suitable for firing. The weapon is removed from the shipping and storage container and inspected in accordance with the "services upon receipt" checks which are found in TM 9-1425-429-12. However, Learning Event 3 does contain an abbreviated set of weapon checks which may be made under field conditions when time and tactical situation permit. In addition, Learning Event 3 describes weapon handling and safety precautions which must be followed by Stinger gunners to prevent injury to personnel and damage to equipment.

When the Stinger crew first receives a weapon, the markings on the container (case) should be checked to be sure that it contains the proper weapon. The yellow squares on two diagonally opposite corners on the case and the yellow data markings indicate it contains a live round. Containers for trainers are marked with blue colored squares for the tracking head trainer and bronze for the field handling trainer. In addition, the data markings are white, and these containers ehave the word "INERT" on the top of the case. Other Stinger equipment and trainer markings are found in TM 9-1425-429-12. The Stinger weapon-round and IFF interrogator containers are sealed to prevent environmental damage. Before the cases are opened, the pressure relief valve should be pressed with the finger. When the rushing noise (if any) stops, the internal pressure of the case is the same as the pressure outside the case. The MRC is not sealed (Figure 14).

FIGURE 14. HANDLING PROCEDURES.



Caution

Improper handling can cause misalignment or electrical/mechanical part damage.

Note: When out of its container, the weapon should be rested only on its left side (sight assembly). Do not stand the weapon on its end or lay it on its right side.

WARNING

Do not fire if weapon/missile-round container has been dropped 5 feet or more.

Be sure that the missile-round has the proper color markings -four 1-inch yellow squares. If it does not, return it to the ASP and exchange it for another weapon.

While the gunner is walking, he should carry the weapon by placing the carrying sling over his shoulder. The front end should point upward or horizontally. The sling should be tight enough to prevent the weapon from swinging. The protective covers (front-end cap and IFF connector cap) should not be removed until preparing to fire or while inspecting the weapon.

ABBREVIATED WEAPON CHECKS

If the Stinger weapon is issued in the field and sufficient time is not available to perform all the checks listed in the technical manual, the crew chief or gunner must, as a minimum, make the checks listed. Under the field conditions, these checks should be made on a daily basis if the tactical situation allows. They should be made at those times when the crew is in a reduced state of alert. These checks are especially important for those weapons which have been outside of their containers and exposed to bad weather.

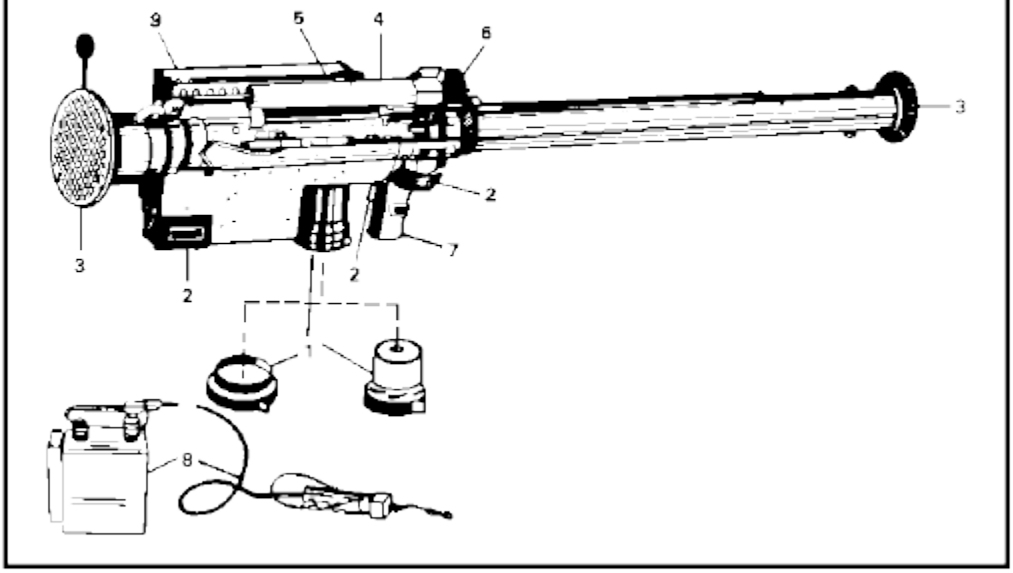
Note: Although sunlight normally will not cause damage to the seeker, care should be taken to keep the uncovered seeker pointed away from the sun.

1. BCU RECEPTACLE CAP, BCU RECEPTACLE, and BCU.
2. SAFETY and ACTUATOR DEVICE, UNCAGING SWITCH, and FIRING TRIGGER.
3. IR WINDOW (front disk) and BLOWOUT DISK (rear).

4. SIGHT ASSEMBLY.
5. DESICCANT CARTRIDGE/HUMIDITY INDICATOR.
6. ACQUISITION INDICATORS.
7. IFF RECEPTACLE.
8. IFF INTERROGATOR and IFF INTERCONNECTING CABLE.
9. IFF ANTENNA.

Items to check (Figure 15)

FIGURE 15. ABBREVIATED WEAPON CHECKS.



BCU Receptacle Cap, BCU Receptacle, and BCU. Perform the following checks:

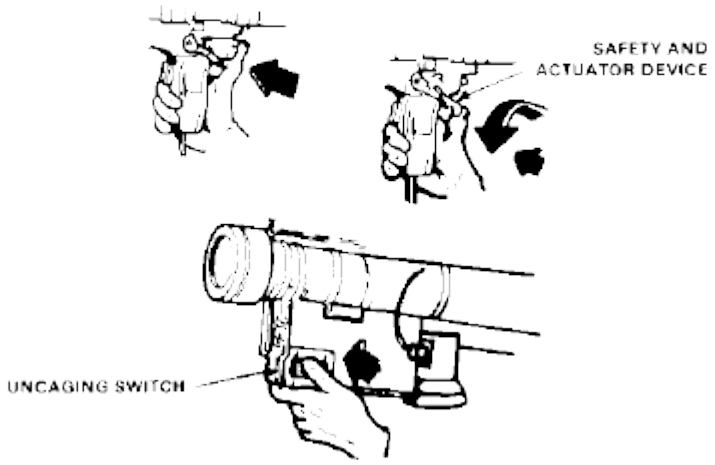
- Remove BCU receptacle cap and check gasket. If missing or damaged, replace.
- Check BCU receptacle interior for foreign matter and clean contacts.
- Replace BCU cap before making remainder of the checks.
- Check that rubber cap is over BCU needle. If the cap is missing or damaged, discard the BCU.
- Check heat-sensitive indicator for pink color. If gray, discard the BCU.

Note: Under tactical conditions when no other BCUs are available, you may use an otherwise defective BCU. Use only as a last resort.

- Safety and Actuator Device, Uncaging Switch, and Firing Trigger (Figure 16). Perform the following checks:
- Safety and Actuator Device. Depress safety and actuator device and rotate it out and forward until it stops. A click should be heard. When released, device should return to its original position and lock.

- Uncaging Switch. Depress uncaging switch three times (once at each end and once in the middle). A click should be heard each time. The switch should return to its normal position each time when released.
- Firing Trigger. Pull firing trigger to its limit. A click should be heard. When released, it should return to its normal position.

FIGURE 16. SAFETY AND ACTUATOR DEVICE, UNCAGING SWITCH AND FIRING TRIGGER.



WARNING

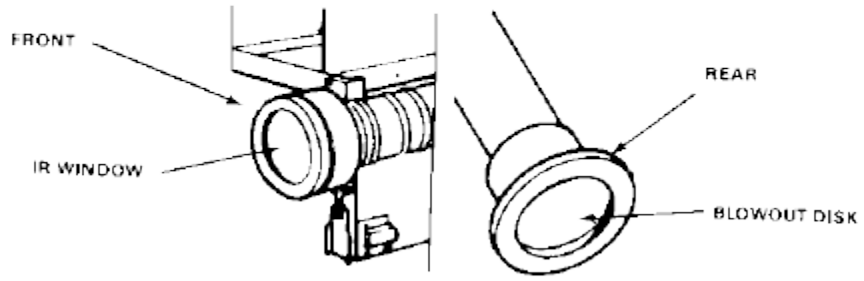
Be sure that BCU is NOT inserted during this check.

IR Window (front disk) and Blowout Disk (rear) (Figure 17). Perform the following checks:

IR Window. Check the IR window (front disk) for foreign matter. Clean with lens cleaning tissue. Inspect for breakage or scratches.

Blowout Disk. Check blowout disk (rear) for foreign matter. Clean with lens cleaning tissue. Inspect for damage.

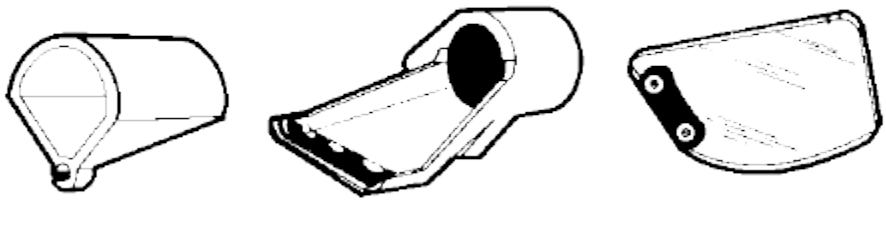
FIGURE 17. IR WINDOW AND BLOWOUT DISK.



Sight Assembly (Figure 18). Perform the following checks:

- Check range ring for visible damage and closure.
- Check rear sight reticle and eyeshield for damage or breakage.
- Replace eyeshield if visibly damaged.

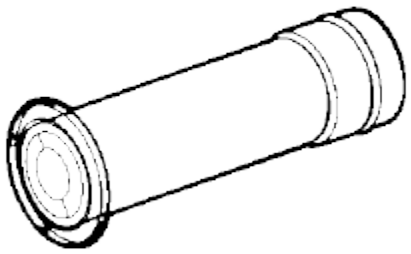
FIGURE 18. SIGHT ASSEMBLY.



Desiccant Cartridge/Humidity Indicator (Figure 19). Check desiccant cartridge/humidity indicator for green color. If tan, replace indicator unit.

Note: If replaced, check color again in 24 hours. If tan color appears again, replace weapon.

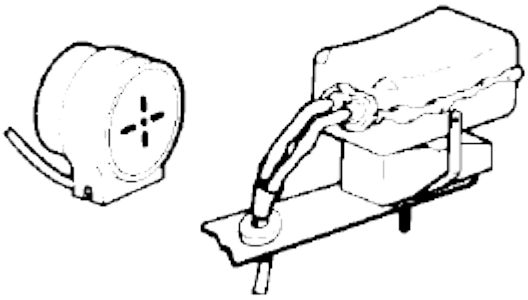
FIGURE 19. DESSICANT CARTRIDGE/HUMIDITY INDICATOR.



DESICCANT CARTRIDGE

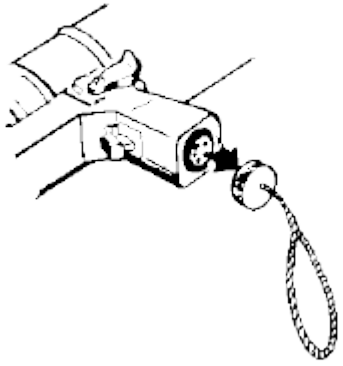
Acquisition Indicators (Figure 20). Check acquisition indicators for visible damage. If damaged, return weapon to ASP.

FIGURE 20. ACQUISITION INDICATORS.



IFF Receptacle (Figure 21). Check IFF receptacle interior for foreign matter. Ensure contacts are clean. Then check the condition of the IFF connector cap. Replace if it is missing or damaged.

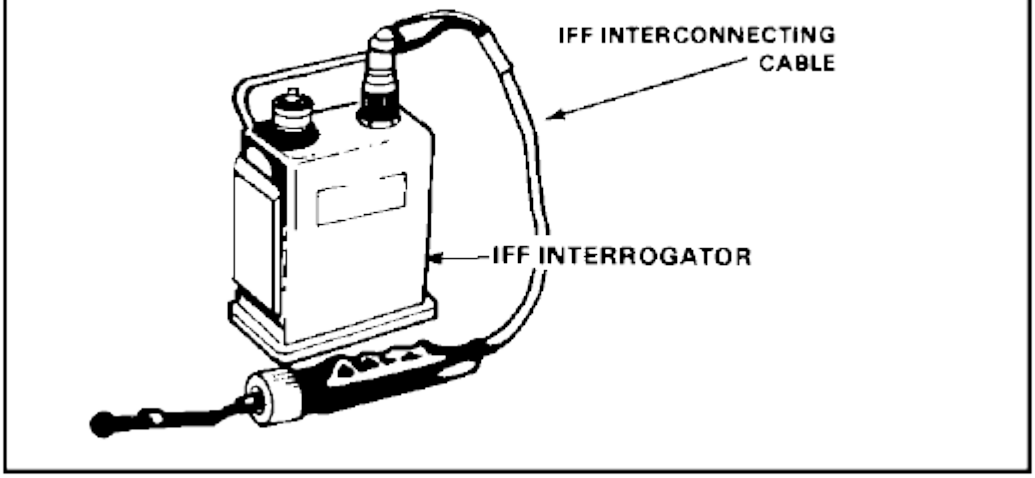
FIGURE 21. IFF RECEPTACLE.



IFF Interrogator and IFF Interconnecting Cable (Figure 22). Perform the following checks:

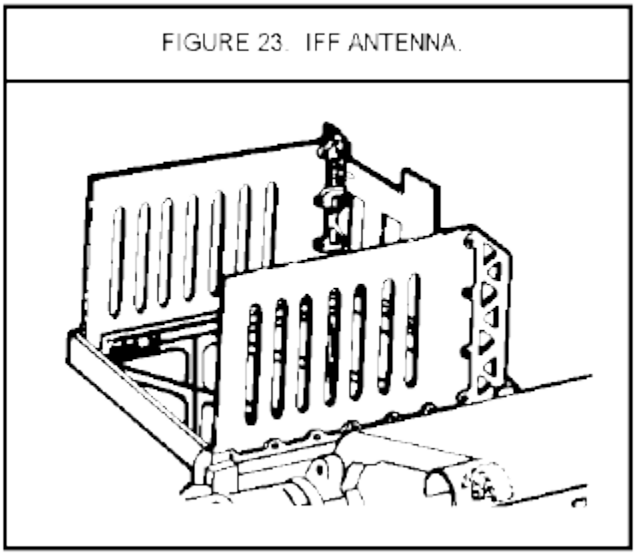
- Check interrogator to be sure it has not been dropped or mishandled.
- Check to make sure protective bar is welded to case and the protective cover is not damaged. Replace the interrogator if necessary.
- Check IFF cable for visual damage or breakage. If it is broken or cut, replace the cable.
- Remove interconnecting cable cover and inspect cable connector for dirt or other contamination. Clean if necessary.
- Check programmer connector cover. If it is missing or damaged, or if the fastener does not function properly, replace.

FIGURE 22. IFF INTERROGATER AND IFF INTERCONNECTING CABLE.



IFF Antenna (Figure 23). Unfold IFF antenna and check for breakage or damage.

FIGURE 23. IFF ANTENNA.



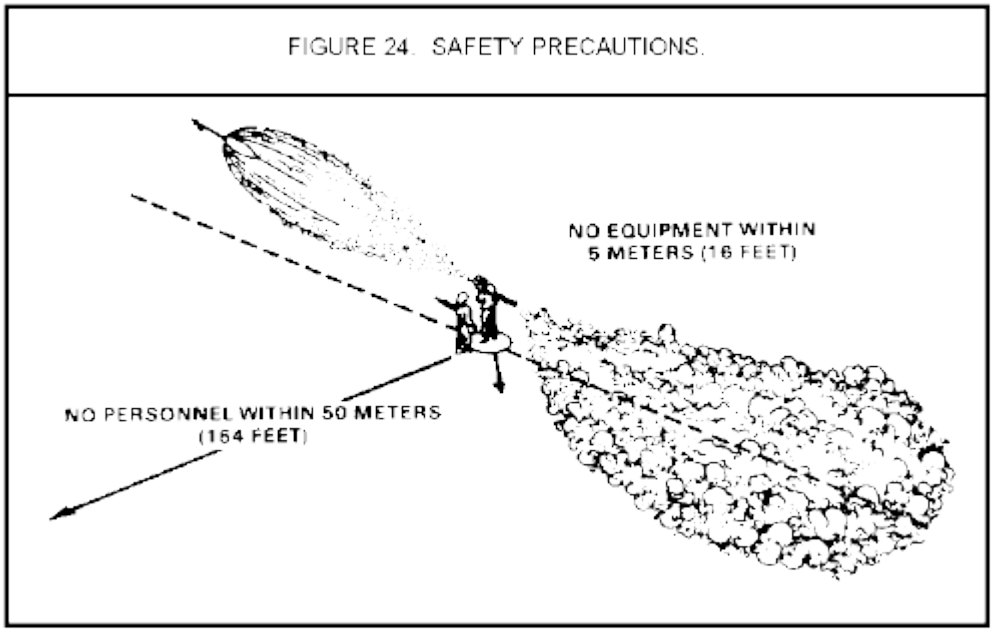
SAFETY PRECAUTIONS

Firing Safety Precautions

The following safety precautions should be observed for all firings:

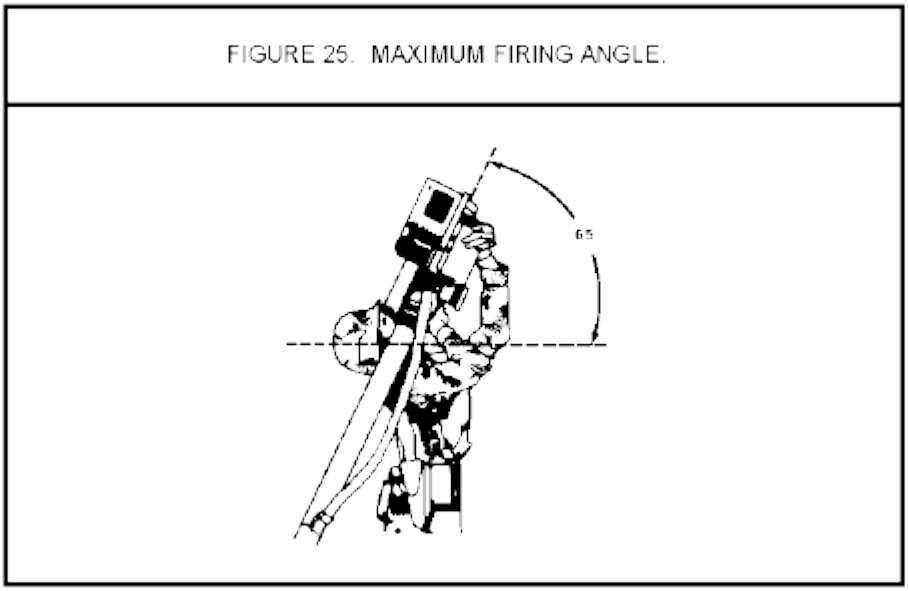
- Fire only from a standing position.
- Wear ear protectors, helmet, and flak jacket when firing. Personnel within 125 meters (about 400 feet) should also wear ear protectors.
- Use the plastic eyeshield on the weapon sight.
- Ensure that the area behind the weapon is clear of other personnel to a distance of 50 meters (164 feet). The crew chief should be close to the gunner's side and ensure that he is not endangered by the weapon backblast. Allow at least 5 meters (16 feet) safety distance from equipment (for example, a vehicle). Under combat conditions, this safety distance for equipment may not always be feasible. Damage to equipment may result if it is within the backblast area (Figure 24).

FIGURE 24. SAFETY PRECAUTIONS.



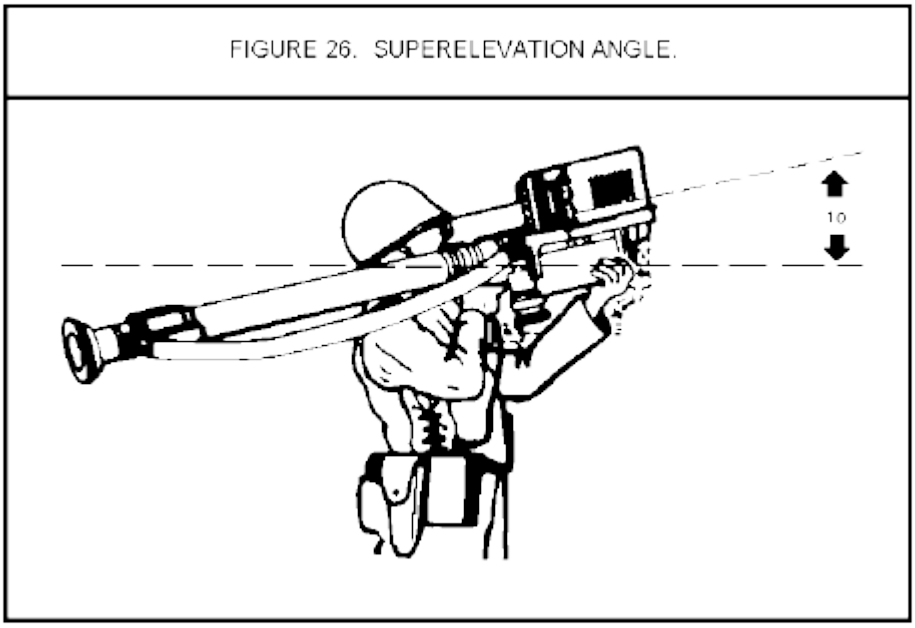
Do not fire at an angle greater than 65º. The flying debris caused by the missile backblast presents a hazard to the gunner if this angle is exceeded or if the launch tube is within 30 inches off the ground (Figure 25).

FIGURE 25. MAXIMUM FIRING ANGLE.



Always superelevate. By superelevating, you make use of the built-in 10 degree angle that compensates for missile drop in flight (Figure 26).

FIGURE 26. SUPERELEVATION ANGLE.



Battery/Coolant Unit (BCU) Insertion and Removal

WARNING

Before inserting the BCU, make certain that the safety and actuator device is in the SAFE position. The Stinger weapon is shipped with a cap covering the BCU receptacle. The cap should be kept in place until just prior to BCU insertion. Remove the receptacle cap by turning it counter- clockwise. Place it in the BCU container found in the shipping or storage container for use at another time. You can also place the cap on some convenient location

on the body (pocket, inside shirt, et cetera). Insert a BCU into the receptacle and turn it clockwise until it locks in place.

WARNING

The case of the BCU gets extremely hot (400oF) 3 minutes after activation and remains too hot to touch for approximately 30 minutes. Do not touch the case except at the heat-insulated cap of a newly fired BCU when removing it from the BCU receptacle. Remove the BCU immediately after firing (or within 45 seconds after activation) by grasping the heat-insulated cap and turning it counterclockwise. After use, it must be discarded. Replace the expended BCU with an unused BCU as explained above.

Caution

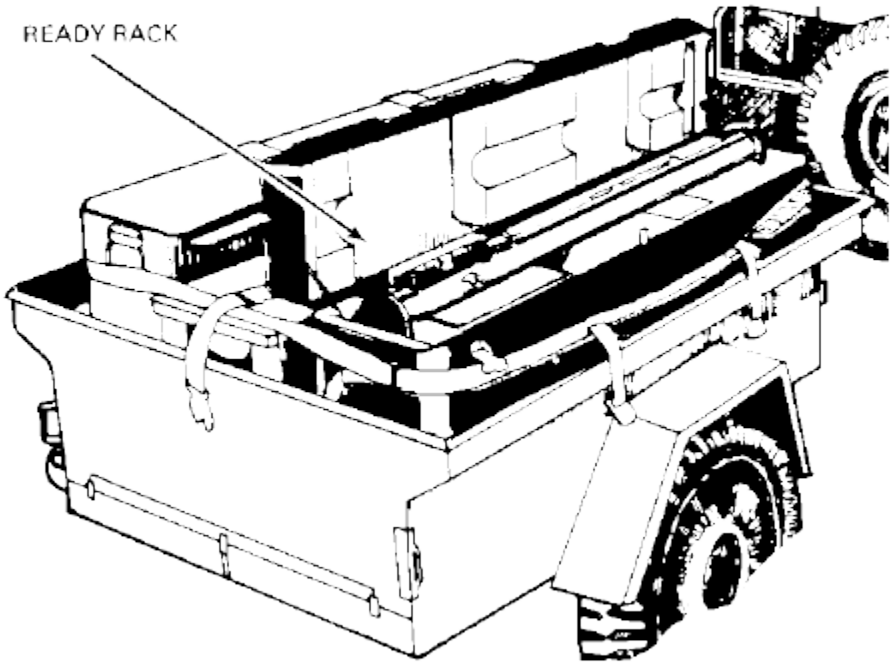
Do not discard the used BCU into dry brush or grass, or near flammable materials.

Conversion of Container to a Ready Rack

The gunner converts a container to a ready rack by using the following procedures (FIGURE 27):

- Unlatch the four latches and lift the container lid.
- Remove the weapon from the container.
- Remove the BCU receptacle cover and stow it in a clothing pocket or other suitable place.
- Insert the BCU into weapon. Place two remaining BCUs in the BCU pouches, with the contact rings downward.
- Remove the IFF interrogator dust cap and stow it in a clothing pocket or other suitable place.
- Remove styrofoam packing cube.
- Place weapon back on ready rack.
- Lower the container lid and relatch the four latches.
- Fasten the transport harness securely.
- Unlatch the container lid.

FIGURE 27. CONVERSION TO READY RACK.



Learning Event 4: FIRING THE STINGER WEAPON

READYING THE STINGER FOR FIRING

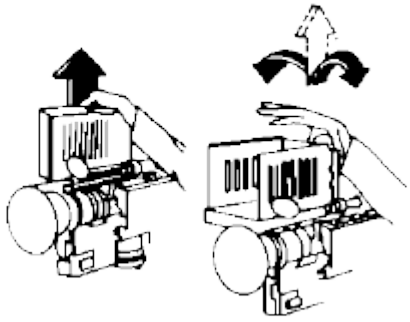
Prior to engaging targets, the Stinger weapon must be readied for action. As a starting point, assume that the Stinger crew is on site with its basic load of weapons. Two of the weapons have BCUs inserted and these weapons are in the container/ready racks on the trailer. The IFF interrogator is on the equipment belt with the interconnecting cable attached to it. The gunner readies the weapon for firing by performing the following steps:

- Open the weapon-round container, remove weapon and place on right shoulder (Figure 28).

FIGURE 28.

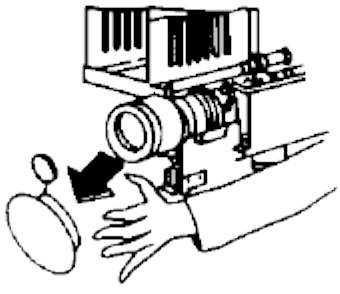
- Unfold antenna with left hand (Figure 29).

FIGURE 29.



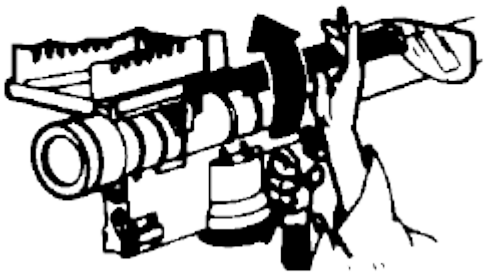
- Remove the front end cap with the left hand (Figure 30).

FIGURE 30.



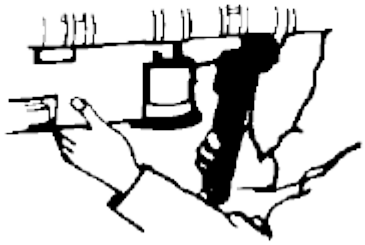
- With the left hand raise the sight assembly into position (Figure 31).

FIGURE 31.



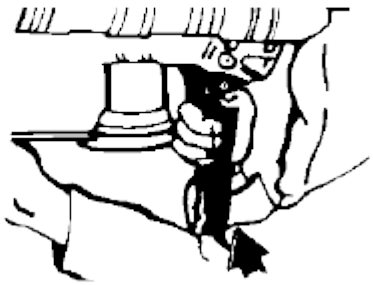
- Hold gripstock with left hand. With the right hand insert IFF interconnecting cable into gripstock (Figure 32).

FIGURE 32.



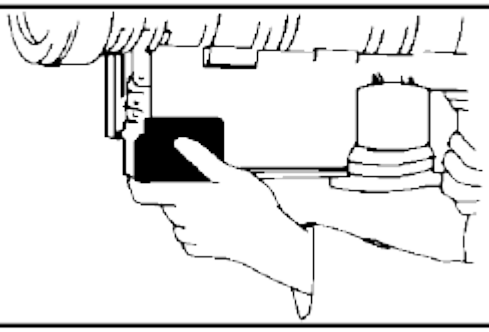
- Slide the right hand up to the trigger grip and hold (Figure 33).

FIGURE 33.



- Move left hand to gripstock. Grasp uncaging switch BUT DO NOT press the switch (Figure 34).

FIGURE 34.

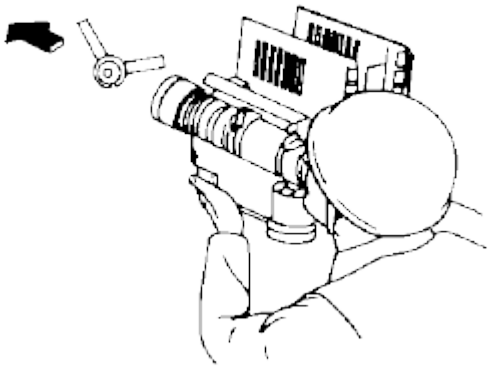


IFF INTERROGATION

When the target is visually detected, the gunner points the launcher toward the target. He sights over the sight assembly and then looks into the peep sight. Next, he positions the target image into the center of the range ring. He challenges the aircraft if it has not been positively identified as friendly.

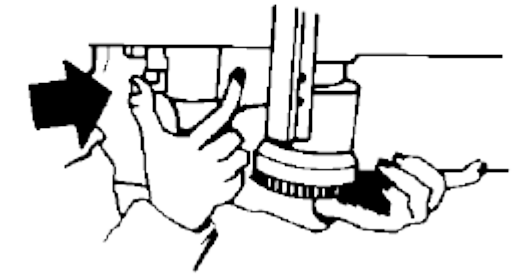
- Point weapon at target and center target in range ring (upper circle) (Figure 35).

FIGURE 35.



- Press IFF challenge switch (if target has already been identified, skip this step) (Figure 36).

FIGURE 36.



- Listen for IFF response (Figure 37).

-Many "beeps" mean an unknown target.

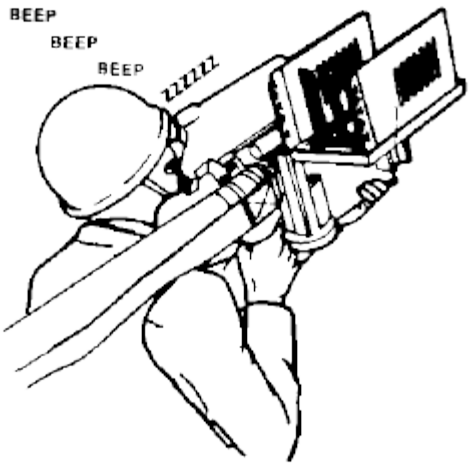
-Two "beeps" mean a mode 4 reply.

-One "beep" means a mode 3 reply.

-No "beeps" means a malfunction.

Note: Depending upon the IFF response and the rules of engagement, the gunner either disengages or proceeds to engage the target.

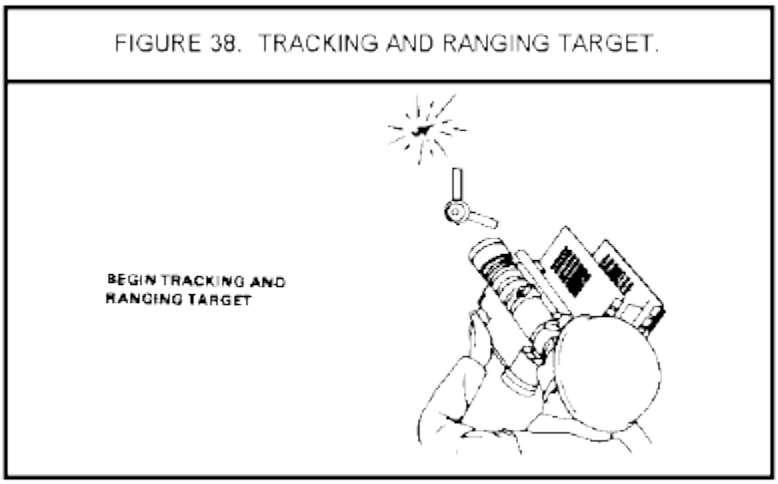
FIGURE 37.



TRACKING

The gunner initially tracks the target by keeping it in the upper range ring circle. The gunner's stance and aiming at the target help him to determine the aircraft's direction of flight. The stance requires that the gunner step directly toward the aircraft with his left foot and lean into the weapon. He then applies the technique of fire applicable to the type of aircraft being engaged. Target tracking occurs prior to weapon activation and continues throughout the firing engagement (Figure 38).

FIGURE 38. TRACKING AND RANGING TARGET.



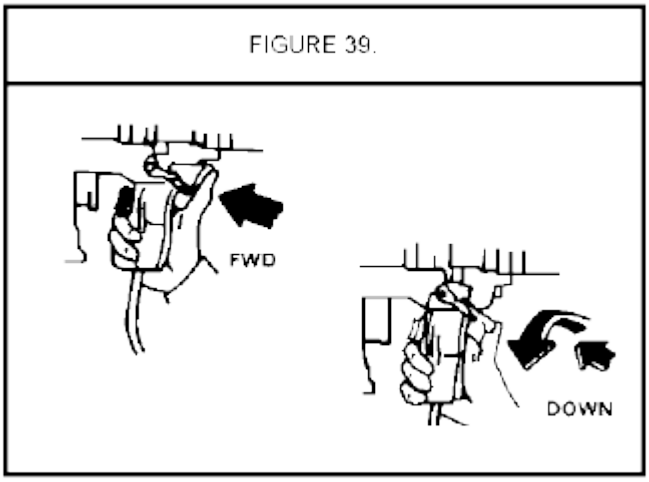
WEAPON ACTIVATION

Press the safety and actuator device forward and down until you hear it click (Figure 39).

Weapon warmup occurs within a period of 3 to 5 seconds during which certain components are brought on to the mechanical and electrical condition required for system operation.

The gunner should hear the gyro spinup noise which indicates the system is becoming operational.

FIGURE 39.



IR ACQUISITION

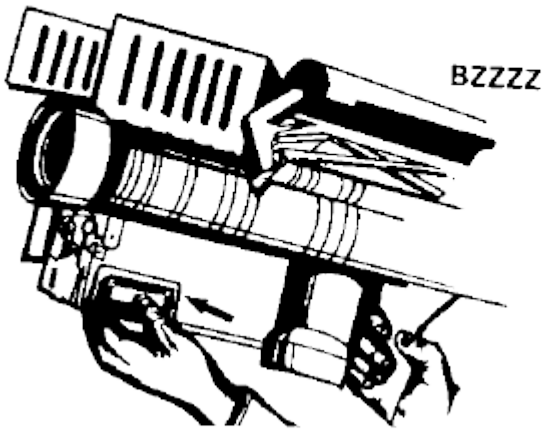
When the target provides sufficient IR radiation to the seeker, acquisition signals will be generated. These signals indicate that the seeker has acquired the target. Two conditions are required for the missile seeker to acquire the target IR radiation: The weapon must be activated and pointed at the target; and the IR radiation from the target must be strong enough to activate the acquisition indicator circuits.

Listen for a distinct acquisition tone. If you aim away from the target when the gyro is caged, the tone will increase or decrease.

UNCAGING

After ensuring that the seeker has acquired the aircraft, the gunner presses the uncaging switch with his left thumb, holds it in, and continues to track the aircraft. After he uncages, the IR tone usually gets steadier and louder. This lets the gunner know that the seeker has locked onto the aircraft and is tracking it. If the tone is lost upon caging, the gunner releases the uncaging switch and continues to track the aircraft in the range ring until he has acquired the tone. He again presses the uncaging switch (Figure 40).

FIGURE 40. UNCAGING SWITCH.



Note: The target must be positively identified as hostile prior to firing.

If IR cannot be obtained, the seeker may be locking on the background instead of the target. The sun is an extremely strong source of IR radiation and the seeker may lock on it instead of the target. The sun's IR radiation is also reflected from objects, causing these objects to become secondary sources of background radiation. When the target is approaching through clouds, haze, close to the ground, or is between the gunner and the sun, background lock may occur. When the gunner cannot acquire the target because of the background radiation, one of the following methods should be used:

Sweeping the Target Method

When the target is low on the horizon, sweep the target. Gently swing the weapon in small movements until the IR tone gets stronger. A clear tone should be received when the aircraft enters the range ring on the sweep (Figure 41).

FIGURE 41. SWEEPING TARGET METHOD.

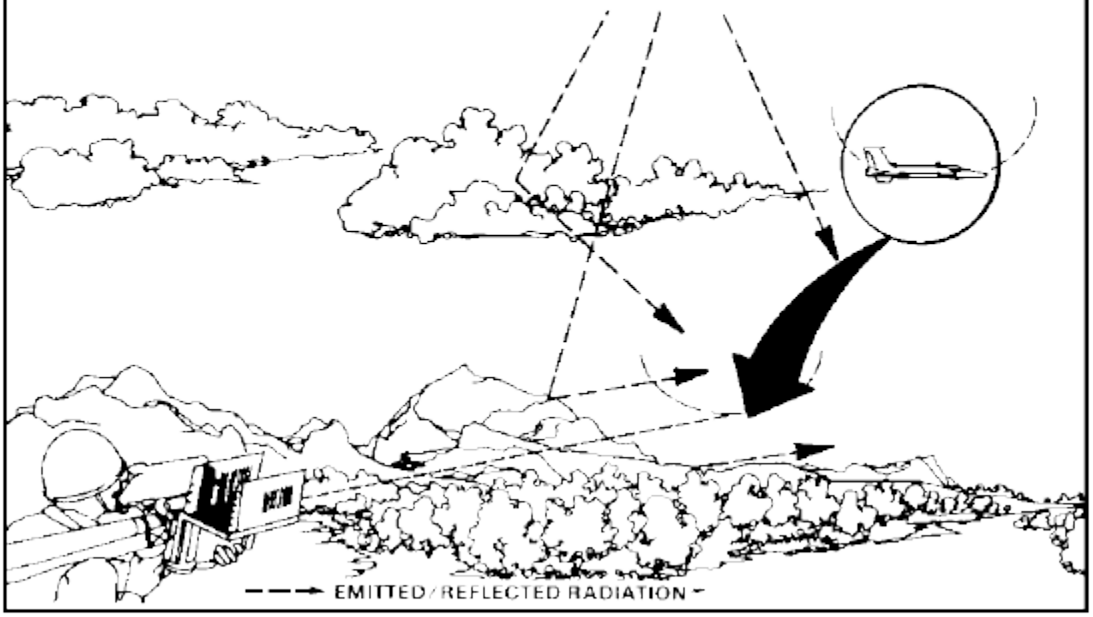
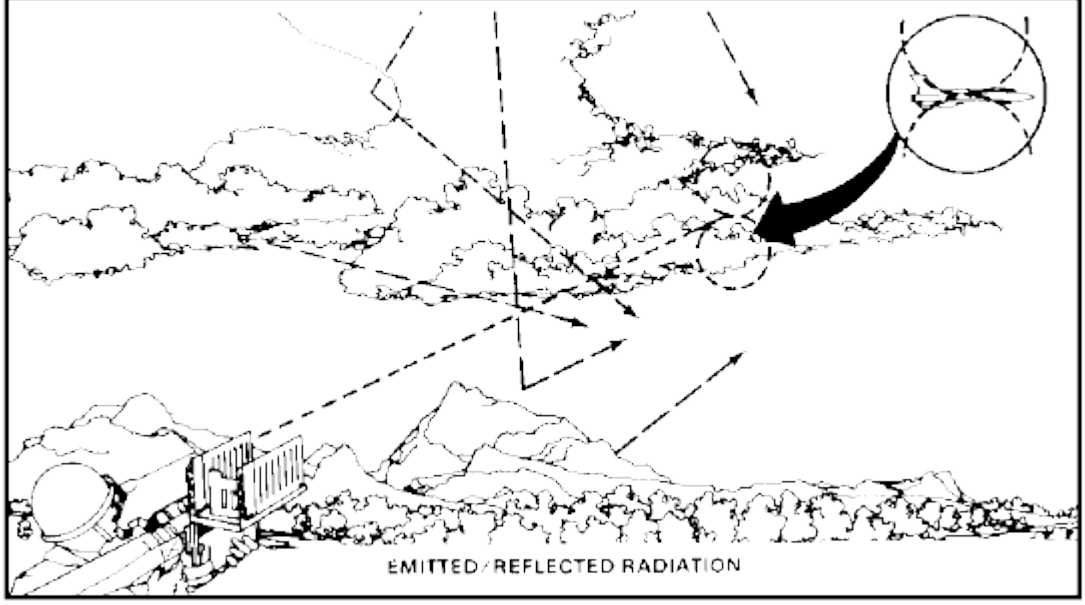


Figure 8 Method

When the target is above the horizon, use the Figure 8 method. Move the weapon, using the target as a starting point, and make two loops as in a figure 8. If you still cannot acquire the target, keep sighting on the target and wait until IR tone gets stronger (Figure 42).

FIGURE 42. FIGURE 8 METHOD.



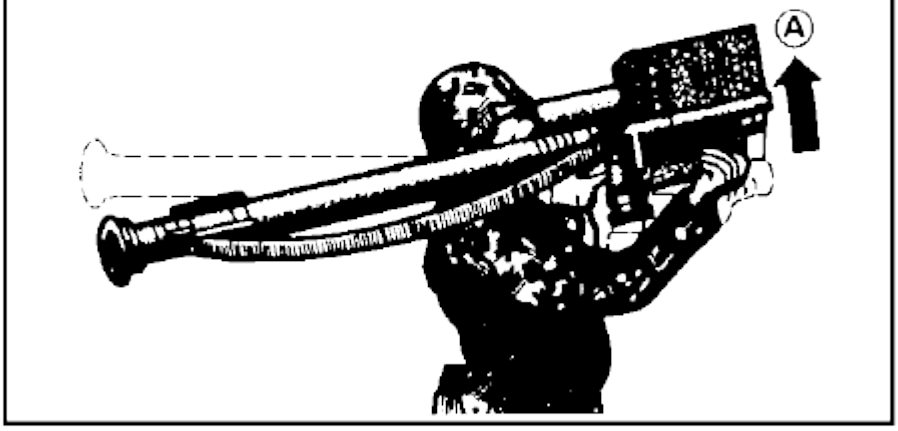
SUPERELEVATION AND LEAD

The gunner inserts superelevation and lead.

Superelevation

Superelevation is the elevation angle added to the missile line of sight. The angle compensates for effects of gravity on the missile prior to flight motor ignition. To superelevate, you raise the front of the weapon (A) (Figure 43).

FIGURE 43. SUPERELEVATION.



Lead

Lead is the angle between the point of aim and the moving target. Lead is required for all targets, except those fixed-wing targets directly incoming or outgoing. Move the aircraft from the range ring (B) where you've been tracking it to either the left (C), center (D), or right lower (E) reticles (Figures 44 and 45).

FIGURE 44. SELECT APPROPRIATE RETICLE.

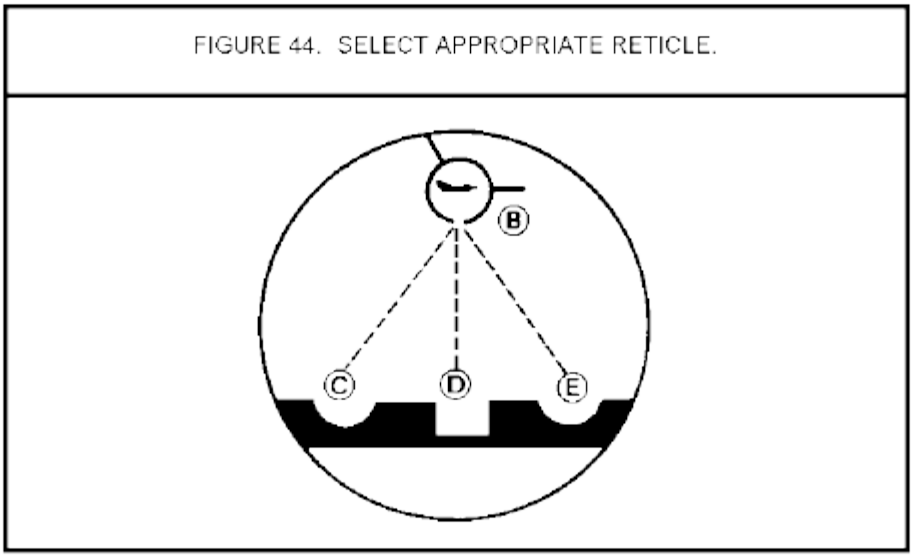
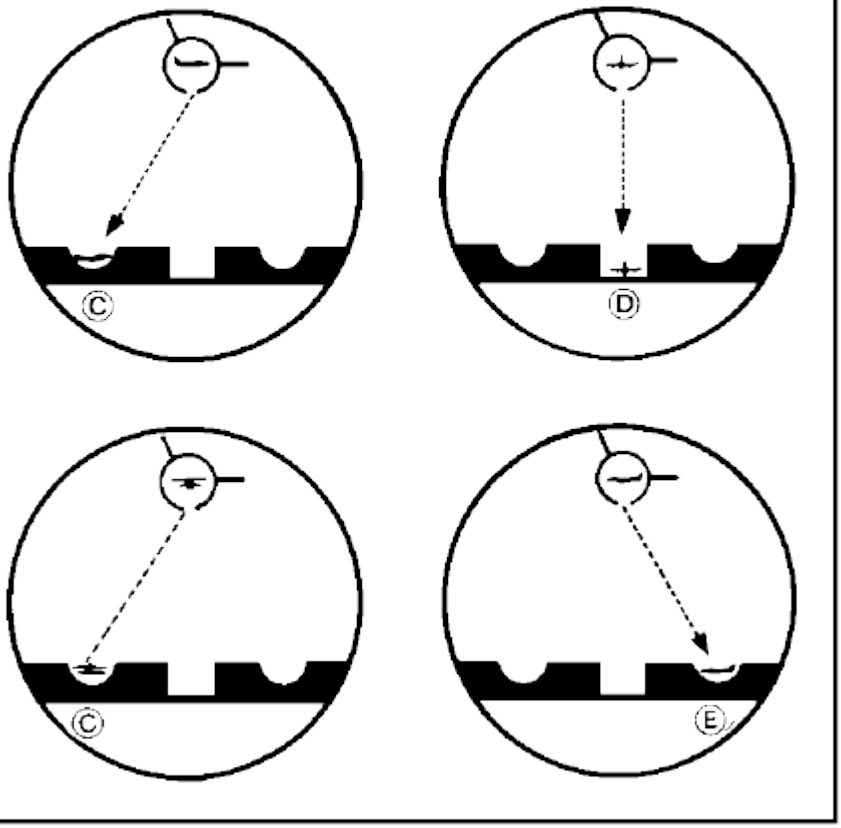


FIGURE 45. SELECT APPROPRIATE RETICLE.



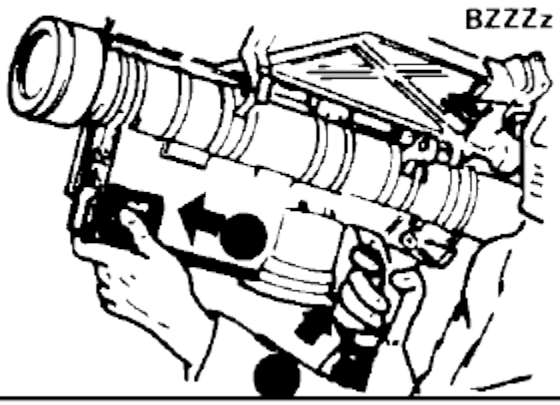
- If the target aircraft or helicopter comes from the LEFT, or slightly from the LEFT, it is placed in the LEFT recticle (C).
- If a helicopter is directly INCOMING or OUTGOING, it is placed in the LEFT reticle (C).
- If the aircraft is directly INCOMING or OUTGOING, it is placed in the CENTER reticle (D).
- If the aircraft or helicopter comes from the RIGHT, or slightly from the RIGHT, it is placed in the RIGHT reticle (E).

FIRING

Before pressing the firing trigger, make sure that you still hear the tone.

Still holding UNCAGING switch (1), squeeze and hold firing trigger (2) (Figure 46).

FIGURE 46. SQUEEZE AND HOLD FIRING TRIGGER.



Continue tracking target until weapon fires and the missile is launched. Release trigger and UNCAGING switch 3 seconds after launch (Figure 47).

FIGURE 47. CONTINUE TRACKING TARGET.

WARNING

When firing, HOLD your BREATH until you release the trigger to avoid inhaling toxic fumes.

POST FIRING PROCEDURES

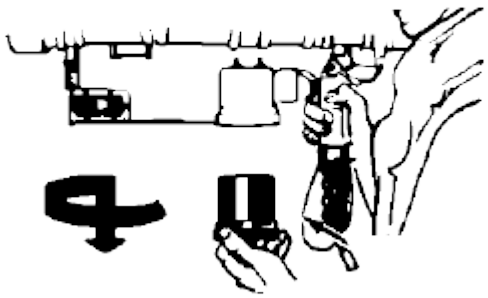
WARNING

The BCU is extremely hot when activated. Grasp it only by heat-insulated cap when you remove it.

Post firing procedures include the following (Figure 48):

- Remove the expended BCU from the gripstock within 3 minutes to prevent damage to the battery receptacle.
- Remove IFF cable by pulling straight down on the quick-release loop attached to the IFF cable connector.
- Place expended weapon on the ground. When the tactical situation permits, remove the gripstock assembly from the expended launch tube. It can be reused on another missile-round. The launch tube will then be discarded.
- Leave firing site quickly to avoid fire from the enemy.

FIGURE 48. POST FIRE PROCEDURES.



HANGFIRES, MISFIRES, AND DUDS

A hangfire is a delay in the functioning of a weapon-round. It can last up to several minutes. A misfire is a complete failure to fire. If a missile does not fire, the following steps should be taken:

- Continue to track the target for an additional 3 to 5 seconds, keeping the firing trigger and UNCAGING switch depressed. If, after approximately 3 to 5 seconds, the missile has not ejected, release the firing trigger and UNCAG-ING switch. Remove the BCU.

WARNING

To remove the BCU, grasp it only by the heat-insulated cap. Do not point the top of the BCU toward the skin, as high pressure gas may still be escaping. Do not handle the used BCU for 2 hours after it has been removed.

- Place the weapon-round on a stand or on the ground. Both ends should be pointed away from the personnel and the front end should be elevated approximately 20 degrees. Leave the firing site without passing in front of or behind the weapon.
- Mark the defective weapon's location and then notify the Explosive Ordnance Disposal (EOD) Unit. Allow at least 3 hours before you approach it.

A dud is a missile whose flight motor does not ignite. It is ejected from the launch tube assembly, travels a short distance, then falls to the ground. In these cases, mark the location and then call the EOD. Remember, the missile is classified and should not be left alone.

WARNING

For a hangfire, misfire, or dud missile, personnel should evacuate the area around the missile for a distance of not less than 1,200 feet. The missile should not be approached for at least 3 hours.

LESSON 1/LEARNING EVENTS 1 AND 2 PRACTICAL EXERCISE

Instructions The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

---

1. The Stinger weapon with BCU inserted weighs (pounds)--

- ○a.34.6
- ○b.34.7
- ○c.35.6
- ○d.34.9

2. The Stinger will provide _____ and _____ units with their own capability to destroy hostile aircraft attacking at low altitude.

3. Located on the separate gripstock assembly are the -.

- ○a.Sight assembly, safety and actuator device, firing trigger, IFF challenge switch, and BCU receptacle.
- ○b.BCU receptacle, IFF interrogator connector, IFF challenge switch, firing trigger, and sight assembly.
- ○c.Safety and actuator device, uncaging switch, firing trigger, IFF challenge switch, IFF interrogator receptacle, BCU receptacle, and latch mechanism.
- ○d.Sight assembly, safety and actuator device, firing trigger, IFF challenge switch, BCU receptacle, and the humidity indicator.

4. The Stinger is a _____ guided missile system capable of engaging a wide variety of aerial targets.

5. The Stinger is capable of engaging _____ and _____ driven aircraft, _____ and _____ piloted vehicles.

6. The FAAR system provides early warning in the form of general target location in terms of distance and direction.

- ○T
- ○F

7. The TADDS displays location and tentative identification of aerial targets which are detected by a FAAR.

- ○T
- ○F

8. A green disk on the TADDS matrix appears for a FRIEND; an orange disk appears for a HOSTILE.

○T
○F

LESSON 1/LEARNING EVENTS 3 AND 4 PRACTICAL EXERCISE

Instructions The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

---

1. The abbreviated weapon checks are especially important for those weapons which have been outside their containers and exposed to bad weather.

○T
○F

2. Under tactical conditions when no other BCUs are available, you may use an otherwise defective BCU as a last resort.

○T
○F

3. The built-in 12 degree Superelevation angle compensates for missile drop.

○T
○F

4. The Stinger is fired preferably from the standing position, but in an emergency can engage aircraft from a foxhole position.

○T
○F

5. Many "beeps" mean-

○a.a malfunction
○b.mode 4 reply
○c.unknown target
○d.mode 3 reply

6. No "beeps" means-

○a.mode 3 reply
○b.unknown target
○c.malfunction
○d.mode 4 reply

7. The gunner initially tracks the target by keeping it in the center lower reticle.

- ○T
- ○F

8. If the aircraft or helicopter comes from the right, or slightly from the right, it is placed in the right reticle.

- ○T
- ○F

9. For a hangfire, misfire, or dud missile, personnel should evacuate the area around the missile for a distance of not less than 1,200 feet.

- ○T
- ○F

10. In case of a dud, the Stinger missile should not be approached for at least 2 hours.

- ○T
- ○F

LESSON 2 MANPAD CREW OPERATIONS

TASK

Describe the methods for detecting, interrogating, identifying, and engaging aircraft. Describe Stinger crew operations.

CONDITIONS

Given information on the methods of aircraft detection and Stinger crew operations.

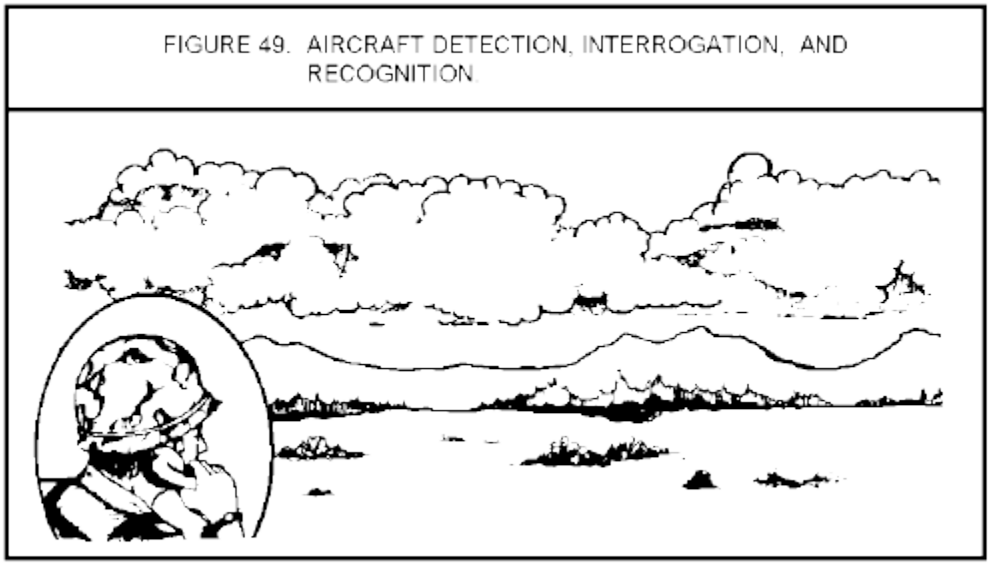
STANDARDS

Demonstrate competency of the task skill and knowledge by responding to the multiple-choice test covering methods of aircraft detection and crew operations. (This objective supports SM Tasks 441-066-3021, 441-066-3024, 441-066-3026, 441-066-3028, 441-066-3032, 441-066-3036, 441-066-3040.)

Learning Event 1: AIRCRAFT DETECTION, INTERROGATION, AND IDENTIFICATION METHODS

To successfully accomplish an engagement, the Stinger crew must be proficient in detecting, interrogating, and identifying aircraft. This lesson focuses primarily on the methods and techniques used in detecting aircraft. Because the identification function is an integral part of the engagement sequence, it is mentioned, where appropriate, in this lesson but is not discussed in detail. Aircraft recognition training is covered in TC 44-30. FM 44-18 tells how to apply rules of engagement, which include hostile criteria and weapons control statuses, in making the decision on whether or not to fire at an aircraft (Figure 49).

FIGURE 49. AIRCRAFT DETECTION, INTERROGATION, AND RECOGNITION



AIRCRAFT DETECTION

The first step in a Stinger engagement is a visual detection of the target. This may be done by either member of the crew. A Stinger crew may be warned of an approaching aircraft by the FAAR/TADDS

system or the early warning broadcast net. In any case, the target location must be made known to the gunner. When warning of the approach of unknown aircraft is received, the Stinger crew can narrow its search sector to the general direction from which the aircraft is coming. The range at which aircraft may be detected varies with several conditions under which detection is tried.

Since Stinger gunners are on the ground, the local terrain will influence the distance at which low-altitude aircraft will unmask; that is, not be hidden behind a hill or other features. Terrain mask should be kept in mind when selecting a site.

Detection Range

The main features of an aircraft that affect detection range are-

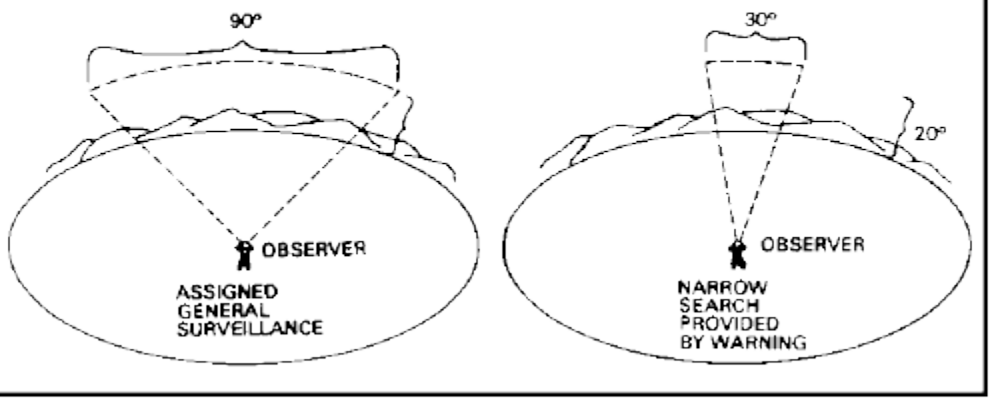
- Size. The larger the target, the farther away it can be detected. Apparent aircraft size varies with the type of aircraft and the aspect from which it is viewed. A jet fighter flying a course directly toward an observer shows a small profile and can get quite close to the observer before it is detected. The same aircraft on a crossing course has a much larger profile and thus can be detected at a greater range.
- Color. The color of an aircraft affects the degree that the aircraft contrasts with the background. Many jet aircraft leave a smoke trail that can be used as an aid in detection at long range.
- Speed. Aircraft speed affects visual detection of aircraft. Detection range decreases as target speed increases.
- Altitude. Aircraft flying at altitudes of 150 to 1,200 feet (46 to 366 meters) are detected at longer ranges than those higher or lower.
- Meteorological Visibility. Rain, snow, dust, fog, smoke, heat shimmer, and haze tend to reduce visibility and tend to reduce the range of visual detection of aircraft.
- Visual Acuity. Observers are required to detect, recognize, and identify small objects at long ranges. Therefore, they must have good eyesight. Their eyes should be rested periodically to prevent fatigue and maintain alertness. Binoculars have little value in detection because they have narrow fields of view. This increases the time required to search a given area of space. Binoculars may help to identify a target after it has been detected.

Search Sector Size

Search sectors should be as small as possible and still have good coverage to both sides of the expected avenues of target approach. When alerted to an approaching target, the search sector should be reduced and concentrated in the general direction of the expected approach. An observer's capability to detect and recognize aircraft increases as the size of the search sector assigned decreases. Detection is more likely if an observer is assigned responsibility for searching a narrow sector than if he is responsible for searching the entire area surrounding his position. If an alert warning system is supporting the observer, he may be assigned a fairly large sector (for example, 90 degrees) for general surveillance. When a warning is received, he then narrows his search sector (for example, 30 degrees) and centers it on the aircraft's approach azimuth 1. Decreasing sector size to less than 30 degrees may not be advisable because of inaccuracies in alert warning system azimuth data. Restricting search to a very narrow

sector centered on warning data may cause the observer to miss aircraft if azimuth data are inaccurate by a few degrees. Often observers, using the horizon as a reference, tend to concentrate their search near the horizon and disregard objects high above the horizon. Therefore, when assigning a search sector, the sector should be defined in both horizontal and vertical planes (Figure 50).

FIGURE 50. SEARCH SECTOR SIZE



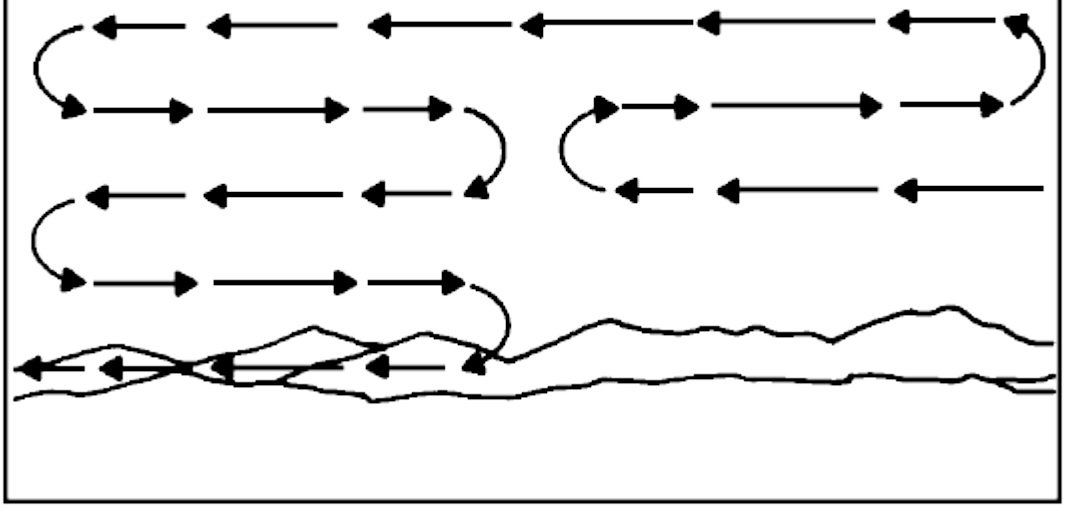
Two techniques are suggested to search for aircraft-one for flat terrain, another for hilly terrain. In both, the observer should-

- Frequently focus his eyes on a distant object, such as a cloud or terrain feature. Otherwise, the eyes tend to relax and distant objects become blurred.
- Search the area near the sun by placing his extended thumb over the sphere of the sun. Looking into the sun, without shielding it, causes the eye to be blinded for a few seconds.
- Squint, if he has trouble focusing at long ranges. Squinting compresses the eyeball, changes its focal length, and makes distant objects come into focus.
- Keep his eyes on the aircraft once he sees it. If he has to look away from it, he notes the direction of the aircraft and moves his eyes away from it when the aircraft is near some object, such as a cloud or a terrain feature; that technique will guide his eyes back to it.

Flat Terrain

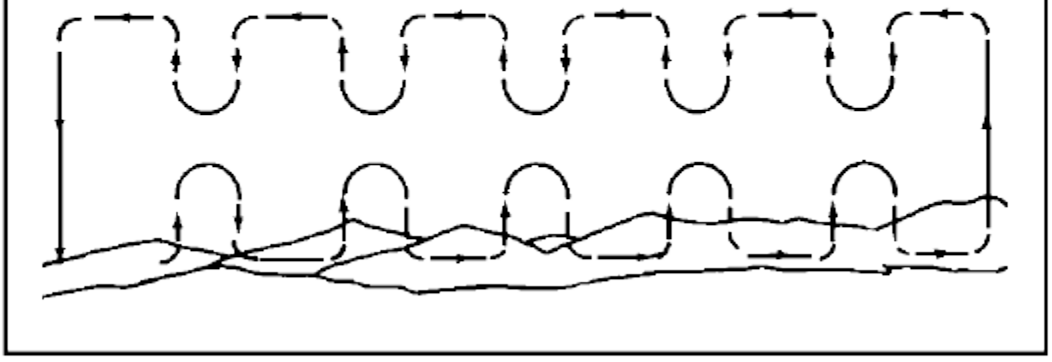
In flat terrain, the observer searches about 20 degrees above the horizon by moving his eyes in short movements across the sky, working his way up and across. He continues the scan pattern below the horizon to detect aircraft flying nap-of- the-earth. More detail is registered this way than with a continuous scan of the horizon (Figure 51).

FIGURE 51. FLAT TERRAIN SEARCH TECHNIQUE.



In hilly terrain the observer searches the sky, using the horizon as a starting point and prominent terrain features as points of reference. He moves his eyes in short movements up the sky, over, then down, continuing this movement across the terrain. He scans in the same pattern below the horizon to detect aircraft flying nap-of-the-earth (Figure 52).

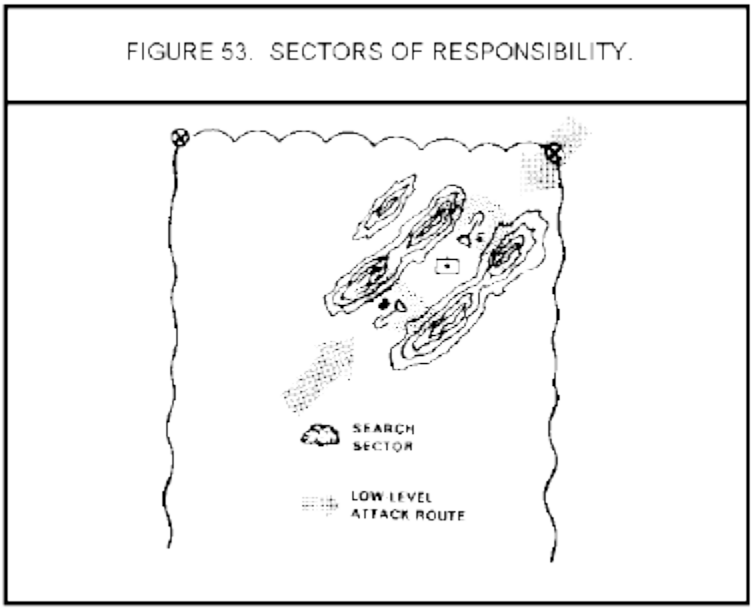
FIGURE 52. HILLY TERRAIN TECHNIQUE.



When the Stinger crew occupies a tactical position, each crew member will take turns searching for aerial targets. This allows one member to search while his partner rests his eyes and provides ground security. Search sectors are arranged to provide all-around coverage of the entire area and overlapping coverage of the assigned sector of fire on likely approach routes. When an alert warning is received, both team members shift primary search emphasis to the azimuth of approach (with frequent all-around scans) until one member detects the target (Figure 55). Stinger crews search for aircraft in their assigned sectors and as prescribed by local standing operating procedures (SOP).

At times, the Stinger crew will be assigned a sector of responsibility by the Stinger section leader to the supported unit commander. When two or more crews are defending a unit in position behind the line of contact (LC), the Stinger crew normally concentrates its search in its assigned sector and occasionally scans the remainder of the horizon. In some instances, the terrain may restrict low- level attack to particular avenues of approach, allowing the search for aircraft to be conducted along these avenues. At other times, the Stinger crew will search for aircraft as specified by local SOPs and as required by the situation. This is common when a Stinger crew is defending a convoy and when it is supporting a maneuver unit in contact or moving to contact with the enemy (Figure 53).

FIGURE 53. SECTORS OF RESPONSIBILITY.



A map reconnaissance of the supported unit's direction of movement or area of operations will help to pinpoint areas from which aircraft are most likely to attack the unit. Mark the far sides of woodlines, ridgelines, and significant folds in the terrain out to at least 3,000 to 5,000 meters. This is where attack helicopters can lie in wait at the maximum range of their current and later model antitank guided missiles (ATGM). Mark restricting terrain-defiles and narrow valleys-where the unit may be forced to pinch together, becoming lucrative targets for air attack.

When accompanying maneuver units in contact or moving to contact with the enemy, the Stinger team usually concentrates its search for aircraft in the general direction of the enemy ground forces and occasionally searches the entire horizon. Other unit personnel should also be constantly alert to the possibility of attack by enemy aircraft. Again, the crew chief marks the route of advance on the TADDS and monitors it and the radio for warning of approaching aircraft.

Many aircraft have telltale signatures which can lead to early detection. Stinger crews should look for such things as-

- Sun reflection from aircraft canopies or cockpit windows.
- Blade flash from rotating helicopter blades.
- Smoke or vapor trails from jet aircraft and missiles or rockets fired from aircraft.

- Dust or excessive movement of tree tops and bushes in a particular area.
- Noise from helicopter blades or from jets breaking the sound barrier.

AIRCRAFT INTERROGATION

Exactly when to interrogate an aircraft depends upon the weapons control status in effect. The following guidelines apply:

REMEMBER

THE RIGHT TO FIRE IN SELF-DEFENSE IS NEVER DENIED, REGARDLESS OF WEAPONS CONTROL STATUS.

WEAPONS FREE

Challenge upon VISUAL detection.

If you receive an "unknown" reply, proceed with your engagement sequence and activate the weapon. Missile launch is permissible on any aircraft not positively identified as friendly.

WEAPONS TIGHT

Challenge upon VISUAL detection.

If you receive an "unknown" reply, proceed with your engagement sequence and activate the weapon. Do not launch the missile until after positive visual identification is achieved.

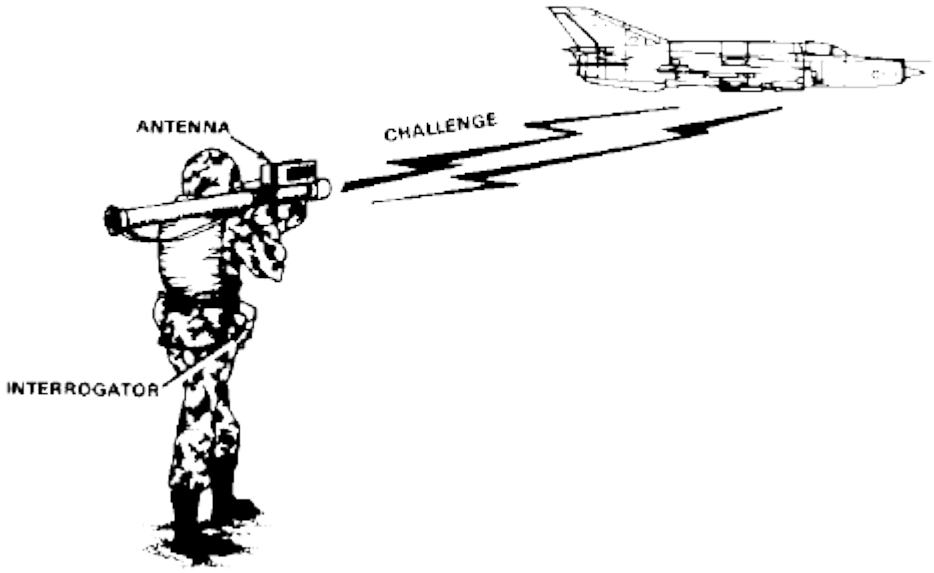
WEAPONS HOLD

DO NOT challenge.

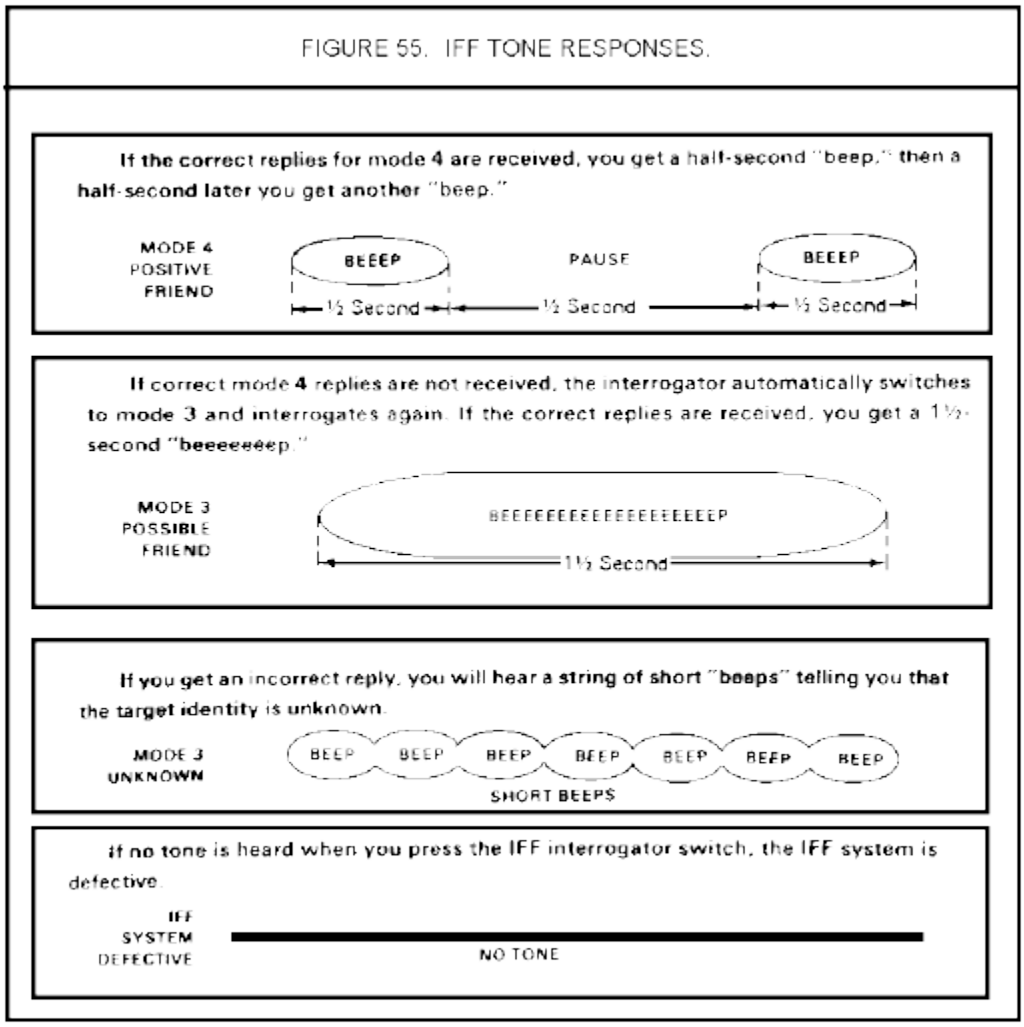
Fire only in self-defense.

The gunner aims his weapon at the target and centers the aircraft in the range ring. He interrogates the aircraft and listens for the IFF response. The operation starts when he presses the IFF challenge switch and lasts about 2 seconds. After triggering, the IFF operation is completely automatic. It is as simple as that (Figure 54).

FIGURE 54. ORDER OF IFF EVENTS.



The IFF can be used before or after weapon activation (Figure 55).



AIRCRAFT IDENTIFICATION

Firing a Stinger missile at an aircraft must be in accordance with specific hostile criteria. Normally, the responsibility for target identification rests with the crew chief. The identification must be completed before the crew chief can issue a command to engage. The gunner may complete the engagement sequence up to firing, but he WILL NOT FIRE without having first received an order to engage from the crew chief. When operating as part of a split crew, or if the crew chief becomes a casualty, the gunner must assume identification responsibilities. After an aircraft has been detected, it must be identified as friendly, hostile, or unknown.

If the aircraft belongs to us or one of our allies, it is a friend and must not be engaged. We need them.

If the aircraft belongs to the enemy, it must be destroyed (except under WEAPONS HOLD). However, the right to fire in self-defense is never denied.

If the aircraft is unknown, the engagement decision is based on a WEAPONS FREE status and application of hostile criteria.

Recognition of the aircraft by name or country of manufacture is a start, but is not conclusive. For instance, the Mirage III/V is made in France. However, it is in service in 23 countries in Europe, the

Middle East, Africa, Australia, and South America. Other aircrafts are similarly spread throughout the world, including some made in the United States. Target identification as hostile must be based on visual inspection of the target and its assessment against specific hostile criteria. The exact criteria in use may vary with the tactical situation, from command to command, and in terms of time and space. For example, the SOP may classify the following situations as hostile:

- Any aircraft actively attacking the crew, the supported unit, or installations may be identified as hostile. The right to self-defense is never denied.
- A TADDS unknown disk is based on the failure of an aircraft to properly respond to the FAAR IFF interrogation. The crew chief may accept a TADDS unknown (foe) disk as a first assumption of hostility. He must then successfully apply at least one more hostile criteria, based on visual observation of the aircraft, before making a final identification of the aircraft as hostile.
- Aircraft performing any of the following acts over friendly troops or territory without prior coordination:
    - Discharging smoke or spray.
    - Discharging parachutists or unloading troops in excess of normal aircraft.
    - Engaging in mine-laying operations.
- Unauthorized or improper entry of aircraft into an area designated as restricted or prohibited. Care should be exercised in applying this criterion. This is necessary to avoid engaging a friendly aircraft that has been damaged and is returning to the rear of our lines. Also, it may have inadvertently strayed into the restricted area due to navigational error.
- Aircraft operating at prohibited speeds, altitudes, or in prohibited directions. The determination of aircraft speed and altitude by ground observers is difficult. Extreme care should be used in applying this criterion.
- Aircraft bearing the military markings or having the configuration of an aircraft employed by a known enemy nation. This is the criterion most likely to be used by the Stinger crew chief and probably the most difficult to apply. Application of this criterion must be based on visual inspection of the aircraft. Since aircraft markings are not usually visible at long ranges, most identifications must be based on recognition of the physical features of the aircraft. To eliminate any element of doubt, the crew chief must be capable of recognizing friendly as well as enemy aircraft.

Learning Event 2: ENGAGEMENT PROCEDURES

The mission of the Stinger crew is to protect the unit which it is supporting from attack by aircraft. To be successful in this mission, the crew members must work together. This objective ties in the actions and decisions made by the crew chief and gunner during the engagement sequence. These actions and decisions must be understood by both crew members prior to and during an engagement.

STINGER CREW

The basic combat unit is the Stinger crew. It consists of a crew chief (SGT) and a gunner (SP4). Both are trained as gunners, in communications, and in detection and recognition of aircraft. During periods of intense air activity, both may act as gunners to increase the rate of fire. A basic load of six Stinger weapons (four weapon-rounds and two missile-rounds) is carried by each crew during combat operations. Stinger crews supporting maneuver units provide an additional means of forward area air defense against aircraft attacking at low altitudes.

COMMAND AND CONTROL

The Stinger crews are commanded and controlled by the section chief. The section chief controls his crews in field operations through use of detailed tactical SOPs. This method of control is used because the crews are usually located at long distances from the section chief's command post. Therefore, direct and personal supervision of each crew is not normally possible. The link between the section chief and his crews is a tactical radio net. Over this net the section chief maneuvers his crews and obtains information on their status and condition. He also modifies their state of readiness by changing the air defense warning and controls their freedom to fire by use of weapons control statuses and fire control orders. Further details on command and control are found in FM 44-18.

FIRE CONTROL ORDERS

The above fire control orders are used as required by section chiefs and crew chiefs (Figure 56).

FIGURE 56. FIRE CONTROL ORDERS.

FIRE CONTROL ORDER	MEANING
ENGAGE	Engage the specified target. This order cancels any previous fire control order which may have been received.
CEASE ENGAGEMENT	Stop tactical activity against a specified target -- prepare to engage another target. This order may be used to reallocate fire against a higher priority target. It can also be used to preclude undesired simultaneous engagement of a target by more than one weapon system.
HOLD FIRE	An emergency fire control order used to stop firing. This order may be used to protect friendly aircraft or in the interests of safety.

CREW CHIEF

The Stinger crew chief is responsible for the decision to engage. He must make the decision based on rules of engagement contained in the unit SOP and with criteria given him by the section chief (Figure

57). In addition to identifying the target, he is responsible for selecting the method of engagement to be used and the specific target to be fired upon.

FIGURE 57. CREW CHIEF'S ENGAGEMENT DECISION.

Method of Engagement

The method used to engage aircraft depends upon the number of aircraft. A multiple target raid is a raid by two or more aircraft flying the same course, at the same speed, less than 1,000 meters apart. All other raids are single target raids.

Single Target Raids. All single target raids are engaged using a SHOOT-LOOK-SHOOT technique of fire. This method is the firing of a first missile (SHOOT) as soon as the requirements for an engagement are met, then an evaluation (LOOK) of the first missile to see if it hit the target. A second (SHOOT) missile will be fired if the first does not hit the target or appears to have failed to achieve guided flight. Upon firing the first missile, the gunner immediately readies another weapon and proceeds to regain visual track and acquire the IR tone of the target. The gunner does not watch the flight of the missile. However, the crew chief observes the flight of the missile, makes the kill evaluation, and, if time permits, directs the gunner to launch another missile. He may launch a missile himself.

Multiple Target Raids. Multiple target raids are engaged using a SHOOT-NEW TARGET-SHOOT technique of fire. This required the launching of as many missiles as possible at successive aircraft in the raid. When practical, fire coordination within a crew will be on voice command of the crew chief. When faced with multiple targets of equal threat, both crew members will engage targets. The crew chief should direct the gunner to fire at the lead or right hostile target in the prime sector of fire. The crew chief engages the trailing or left hostile target. When a multiple target is to be engaged, a typical command would be HOSTILE, SHOOT-NEW TARGET-SHOOT, ENGAGE. Fire will be withheld if friendly and hostile aircraft are closely intermixed. (For further details, refer to FM 44-18 and your unit SOP.)

Gunner's Firing Actions

When the gunner detects the target or receives direction from the crew chief on the target, the gunner attempts to acquire the target in the sight. He is assisted by the crew chief in acquiring the correct target. When tracking has been established, the gunner continues tracking while waiting for an engagement command. The crew chief's engagement command releases the gunner to fire when the gunner decides that the aircraft meets the technical requirements for a successful engagement. Several essential elements of the engagement sequence must be met before the gunner can properly fire.

- The target is being tracked smoothly.
- The target has been identified as hostile or unknown.
- The target has been determined to be in range.
- The weapon has been activated.
- The IR acquisition tone has been received.
- The seeker has been uncaged and the IR acquisition tone is clear and steady.
- The gunner continues to track the target.
- Superelevation and lead are applied.
- The gunner has received the engagement command from the crew chief.

Crew Chief's Engagement Decision

When the crew chief has made a firm decision, he will issue an engagement command to the gunner. The command must include the words HOSTILE and ENGAGE and specify the method of engagement. Typical commands would be-

HOSTILE, SHOOT-LOOK-SHOOT, ENGAGE.

HOSTILE, SHOOT-NEW TARGET-SHOOT, ENGAGE.

The following situations show how the Stinger crew chief uses his prescribed rules to make an engagement decision. It is critical that this decision be timely and accurate. To accomplish this, the crew chief must thoroughly understand the rules of engagement and control measures applicable to the Stinger system. I am a Stinger crew chief in the following four situations (Figures 58 through 61).

FIGURE 58. WEAPONS TIGHT.

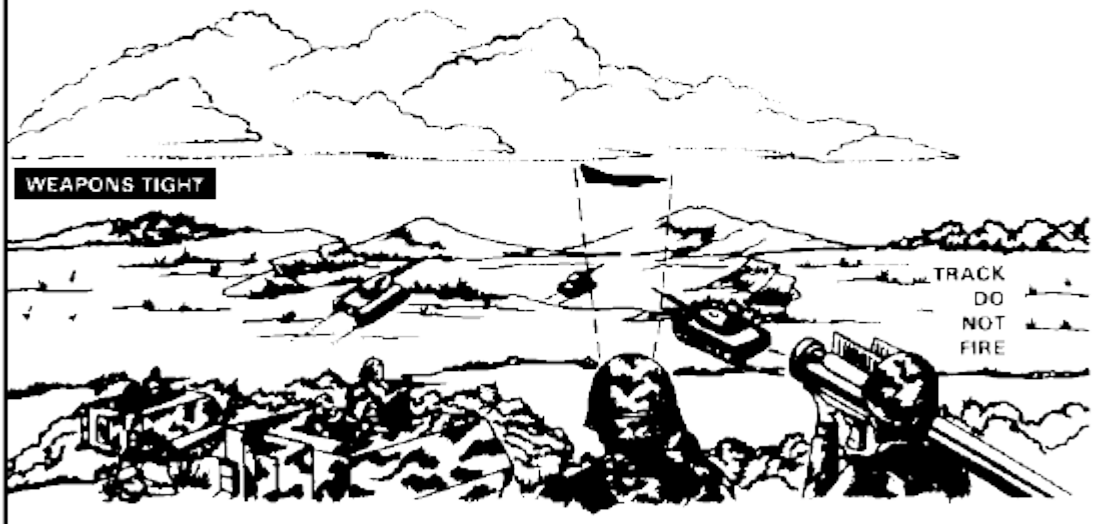
An aircraft is approaching my position very fast and very low. The section chief has announced a WCS of WEAPONS TIGHT. My gunner has acquired the aircraft. I cannot visually identify the aircraft at this time. I direct the gunner to interrogate. The gunner challenges and receives an unknown IFF response. (BEEP, BEEP, BEEP, BEEP - - -.)

ACTION TAKEN

I cannot engage the aircraft because I cannot positively identify it as hostile. I do not ignore it, but direct my gunner to continue tracking the aircraft.

REASON

WEAPONS TIGHT requires that I make positive hostile identification before engaging.



As the aircraft comes closer, I positively identify it as a MiG-23. It bears an enemy national insignia.

ACTION TAKEN

I order my gunner to engage.

REASON

By visually identifying the aircraft as hostile, I have met the criteria for engagement under WEAPONS TIGHT.

FIGURE 59. WEAPONS HOLD.

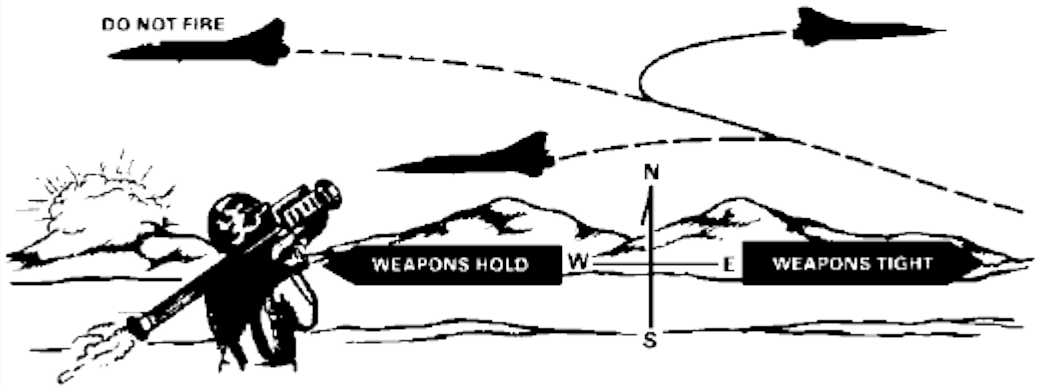
At 1230, I received a message from my section chief. He stated, "WEAPONS HOLD on all jet aircraft flying westbound between 1300 and 1330. WEAPONS TIGHT for all other aircraft." At 1315, a jet aircraft I recognize as hostile approaches westbound. It is coming within range of my gunner's weapon.

ACTION TAKEN

I don't engage but continue to observe. My gunner tracks the aircraft and waits for my command to engage. I report the incident to my section chief. If the aircraft changes its heading, so that it is no longer westbound, I will order my gunner to engage.

REASON

Under WEAPONS HOLD, I cannot engage except in self-defense. If the aircraft changes headings, I am then under WEAPONS TIGHT. Since I've already visually identified the aircraft as hostile, I can then engage.



The aircraft continues on the same heading and fires two tactical air-to-surface missiles at the unit I am supporting.

ACTION TAKEN

I order my gunner to engage.

REASON

I have the right to engage any aircraft in self-defense. This rule applies not only to an attack on my position, but to the unit I am supporting as well.

FIGURE 60. PRIMARY TARGET LINE (PTL).

SITUATION 3

At 1400 my section chief orders me to go to a new position to become part of a four team defense of a supply depot. Upon arrival, he assigns me a primary search sector of 0° to 90° and a primary target line (PTL) of 45°. The WCS is WEAPONS TIGHT. Three aircraft approach, one at 90°, one at 45°, and one at 20°. All three are at the same range and appear to be moving at the same speed. I visually identify the aircraft at 45° as friendly. I visually identify the aircraft at 20° as hostile. I then turn my attention to the aircraft at 90°. I also visually identify this aircraft as hostile.

ACTION TAKEN

I direct my gunner to engage the aircraft at 90°. I then pick up a second weapon system, and engage the aircraft at 20°.

REASON

Since all three aircraft are at the same range and speed, they present an equal threat to the defended asset. The aircraft at 45° is on my PTL and is, therefore, the first aircraft I must look at. Since I visually identify it as friendly and there are other aircraft in the area, I ignore it and look at the second aircraft within my primary search sector and closest to my PTL. I identify it as hostile. I then look at the third aircraft and identify it as hostile. Since this is a multiple aircraft raid, I order my gunner to engage the aircraft on the right. I pick up a second weapon system and engage the aircraft on the left.

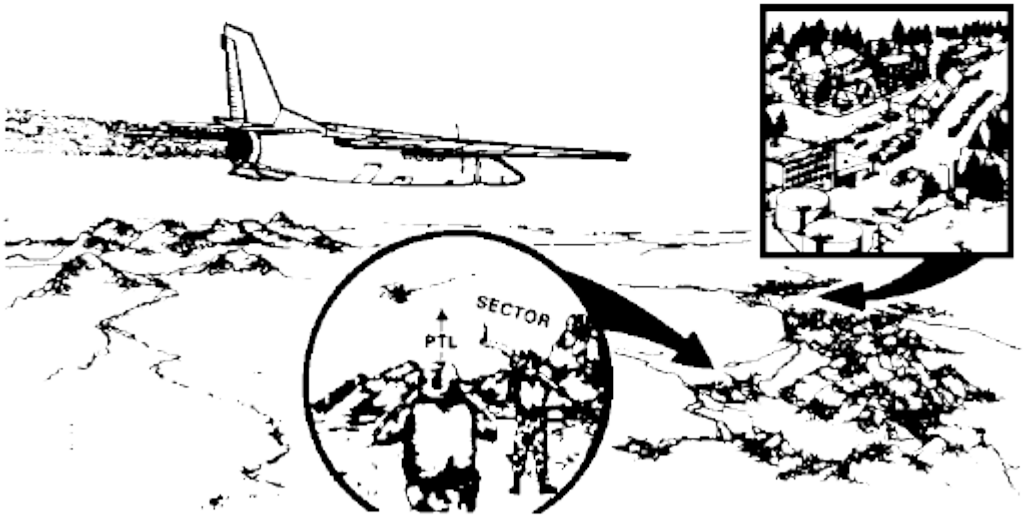


FIGURE 61. WEAPONS FREE.

SITUATION 4

I receive a message from my section chief changing the weapons control status to WEAPONS FREE. A jet aircraft approaches my position at a low altitude and high speed. I direct the gunner to challenge the aircraft on detection. He receives an unknown audible signal. The aircraft is still too far out to be visually identified.

Action Taken

I order my gunner to engage and continue my attempts to visually identify the aircraft while the gunner goes through the engagement sequence. I visually identify the aircraft as hostile. I direct the gunner to fire.

Reason

I was authorized to order the engagement because WEAPONS FREE means I should engage aircraft not positively identified as friendly. Since there were no other aircraft in the area, I continued to watch the aircraft until I could visually identify it. Had there been other aircraft in the area, I would have directed my attention at another aircraft. The gunner would then have attempted to visually identify the aircraft before firing. The missile was launched only after the aircraft was identified as not friendly. If I had identified the aircraft as friendly after the order to engage was given, I would have called out, "CEASE ENGAGEMENT."

Learning Event 3: METHODS OF ENGAGING AIRCRAFT

The speed of modern aircraft is such that the time allowed for completing an engagement may not be more than 10 to 20 seconds. To accomplish all of the tasks required for a successful engagement in this short time requires a smooth, rapid, and almost automatic response by the gunner to every engagement situation. To obtain this type of response requires a set of rules and procedures which can be learned to the point that they can be applied automatically. Previous objectives have dealt with the subjects of detecting and identifying aircraft and how to handle and operate the Stinger weapon. This objective outlines firing techniques necessary to engage aircraft. For the engagement to be successful, these additional decisions must be made.

- Determine if the aircraft is a jet or propeller driven aircraft.
- Activate early enough for target engagement.

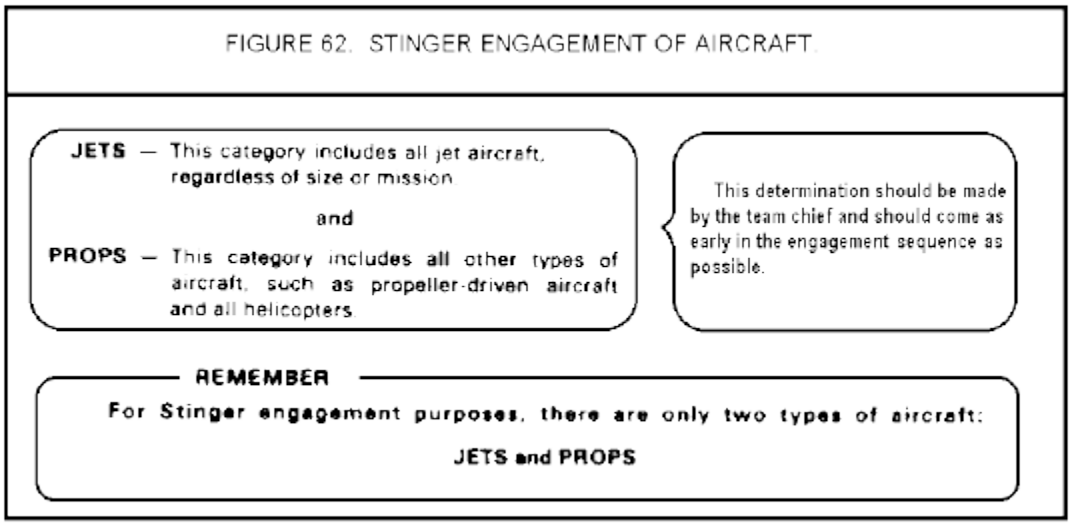
- Determine if the aircraft is an incoming/outgoing or crossing target.
- Launch the Stinger missile to engage the aircraft within Stinger's range.

TECHNIQUES OF FIRE

Stinger crew members must make certain decisions that make up the Stinger weapon firing technique. These decisions are combined with other mechanical operations to complete the engagement process. Stinger crew members must make the following decisions:

- Determine if the aircraft is a jet or prop (Figure 62).

FIGURE 62. STINGER ENGAGEMENT OF AIRCRAFT.



- Determine when to activate the weapon. Upon detection, a decision must be made immediately by the crew chief as to whether or not the aircraft is a potential threat. If its direction of flight indicates that it will penetrate the defended area, the gunner issues an IFF challenge. If the aircraft fails to correctly respond to the IFF challenge, it is considered a potential threat. The crew chief orders the gunner to activate the weapon at this point. For slowmoving targets, or targets detected at extremely long ranges, the 30-second life of the BCU may expire prior to launch. The gunner will be cued to this event by a noticeable loss in prelaunch power in the weapon. A significant noise level decreases in the IR tone and gyro spin will also take place as the BCU reaches its life limit. If a BCU is expended prior to a launch, the gunner merely inserts a new BCU and resumes the engagement sequence. The removal and insertion of a BCU can be accomplished in a few seconds. By following this insertion of a BCU can be accomplished in a few seconds. By following this procedure of activating when the aircraft is judged to be a potential threat, a few BCUs may be expended. However, few if any targets will escape engagement.

ACTIVATE RULE

ACTIVATE WHEN THE AIRCRAFT APPEARS TO BE PENETRATING THE DEFENDED AREA AND FAILS TO CORRECTLY RESPOND TO AN IFF CHALLENGE.

- Determine if the aircraft is an incoming/outgoing or crossing target. Once the aircraft is detected, the weapon is sighted so that the aircraft's image is aligned within the range ring of the weapon sight. Tracking the aircraft in the proper stance will help the gunner determine whether the aircraft is on an incoming/outgoing or crossing path. The gunner assumes a proper stance by stepping directly toward the target with his left foot and leaning into the weapon. In this position, if the gunner has any horizontal movement of his arms or upper body as he tracks the target, then the target should be considered crossing. If there is a lack of any horizontal movement, then the target should be considered incoming/outgoing. Also indicative of an incoming/outgoing aircraft is any vertical movement of the gunner's arms or upper body.

REMEMBER

If the gunner has any horizontal movement of his arms and upper body while tracking an aircraft, then the aircraft is a crossing target.

If there is NO horizontal movement, the aircraft is an incoming/outgoing target.

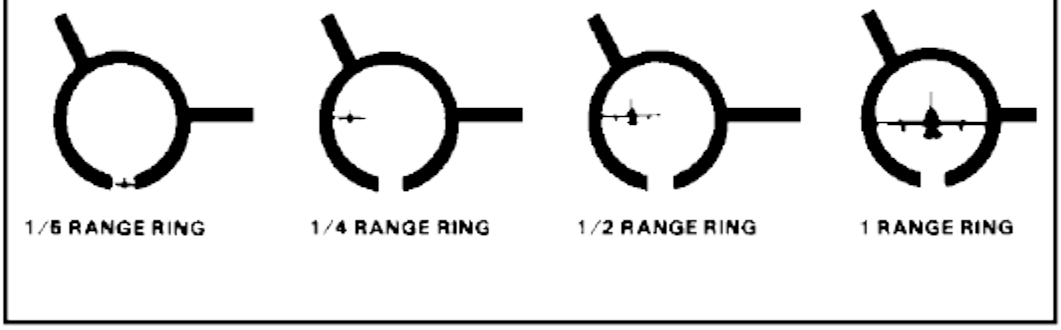
- Determine when to launch the Stinger missile. When to launch is the most critical decision made by the Stinger gunner. He must evaluate the target and determine if the target is within the Stinger missile's range. The type of aircraft (jet or prop) and the flight path (incoming/outgoing or crossing) will determine what rule will be used for the launch decision. By applying the specific rule for the type and flight path of the aircraft, the Stinger gunner can be assured that he will fire within the effective range of the missile.

INCOMING/OUTGOING JETS

For incoming/outgoing jet aircraft, the launch decision is based on a range ring measurement. The gunner moves the weapon so that the aircraft's image is within the range ring of the sight. He then evaluates the size of the aircraft image relative to the width the range ring. For example, if the aircraft's size within the range ring is approximately one-half the size of the range ring measured across, then the aircraft is at one-half of the range ring. A helpful hint in estimating aircraft size within the range ring is to place the aircraft at the inner left (or right) edge of the range ring before making a size estimate. The gap at the bottom of the range ring is also used to measure range ring size. This gap measures one-fifth the size of the range ring. When an aircraft fills this gap, it is at one-fifth range ring. To determine when to launch the missile at an incoming/outgoing jet, the gunner tracks the jet and makes continuous size estimates. When the jet reaches a specified range ring size, it is considered to be within range of the missile. This is the earliest point at which the gunner may launch. He is also given a second range ring measurement to indicate when he is to hold fire on the jet (Figure 63).

When to launch the missile at incoming/outgoing jet aircraft is based on the RANGE RING MEASUREMENTS RULE.

FIGURE 63. INCOMING/OUTGOING JET AIRCRAFT.

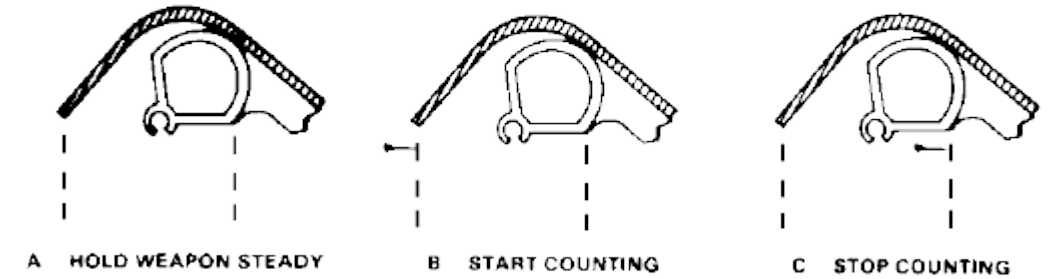


Note: The actual range ring measurements used in determining when to launch at incoming jets are classified and are contained in (S)FM 44-1A(U).

Crossing Jets

For crossing jets, the launch decision is based on a time count rule. The gunner positions the weapon sight slightly forward of a crossing jet image, then holds the weapon stationary. He waits until the jet's nose reaches a fixed point within the sight. When it reaches this fixed point, the gunner begins counting off in seconds, "one thousand one, one thousand two..." He watches the jet travel horizontally to another fixed point before or at the same time that this specified second is counted off, then the jet is within the missile's range. The gunner can launch the missile. However, if the jet takes longer than the specified time to travel from one fixed point to another, then the jet is beyond the missile's range. The gunner must not fire (Figure 64).

FIGURE 64. CROSSING JET AIRCRAFT.



The following example, using a hypothetical time count rule, is offered for illustration purposes only. Assume that the time count rule specifies, "Launch at a crossing jet if it travels from one edge of the weapon sight to the opposite edge in less than 4 seconds." Consider the gunner engaging a jet crossing from left to right. He positions the weapon sight slightly to the right of the crossing jet, then holds the weapon steady (A). He waits until the jet's nose reaches the first fixed point-the left edge of the weapon

sight (B). When the jet reaches this point, the gunner begins counting off, "one thousand one, one thousand two..." If the jet's nose reaches the right edge before or at the moment the gunner counts off one thousand four, the jet is within the missile's range (C). The gunner can launch the missile. However, if the jet has not reached the right edge by one thousand four, it is beyond the range of the missile. The gunner must not fire (Figures 63 and 64). When to launch the missile at crossing jet aircraft is based on the TIME COUNT RULE.

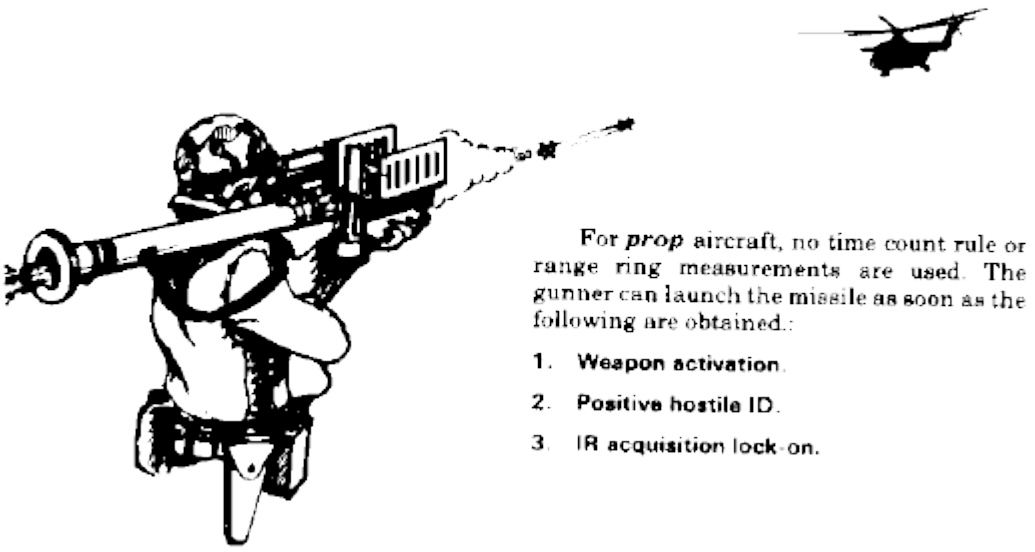
Note: The tail of the aircraft may be used instead of the nose in this procedure. However, only one aircraft section -nose or tail-must be used throughout the procedure.

Note: Refer to (S)FM 44-1A(U) for the actual fixed points and the number of seconds (time count rule) used in determining when to launch at crossing jets.

PROPELLER-DRIVEN AIRCRAFT AND HELICOPTERS

For propeller-driven aircraft and helicopters, no time count rule or range ring measurements are used (Figure 65).

FIGURE 65. PROPELLER-DRIVEN AIRCRAFT (INCLUDES ALL HELICOPTERS).



STINGER LAUNCH RULES

Jet Aircraft

Incoming/Outgoing Aircraft. Launch when the jet image is within the proper range ring sizes.

Crossing Aircraft. Launch if the jet meets the time count rule criteria.

Propeller-Driven Aircraft

Launch when the weapon is activated, a positive hostile ID is made, and IR acquisition lock-on is obtained.

Engagement Sequence

The following section outlines a basic sequence of events for engagement of jet and prop aircraft. The sequence of events places events in the order that they usually occur, but it is not rigid. For example, determining aircraft type (jet or prop) and identification may take place at any time prior to launch. Also, certain actions, such as tracking and determining whether the jet is incoming or crossing, are done continuously throughout the engagement sequence (Figures 66 through 75).

FIGURE 66. AIRCRAFT DETECTION.

DETECT THE AIRCRAFT

This is done by either the team chief or the gunner. It may be prompted by a TADDS or radio command net early warning.

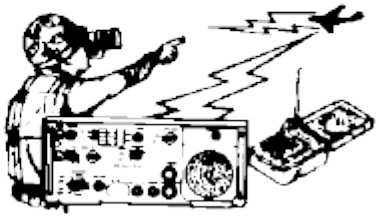


FIGURE 67. SHOULDERING AND TRACKING.

SHOULDER THE WEAPON AND BEGIN TRACKING

In this step, the gunner shoulders the weapon, unfolds the antenna, removes the end cap, raises the sight, and connects the IFF cable (if these actions had not been previously done). He moves the weapon so that the aircraft's image is placed within the range ring and then begins tracking the target.

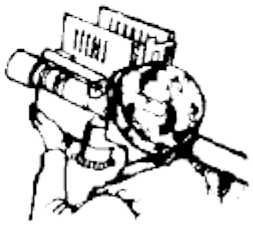


FIGURE 69. WEAPON ACTIVATION.

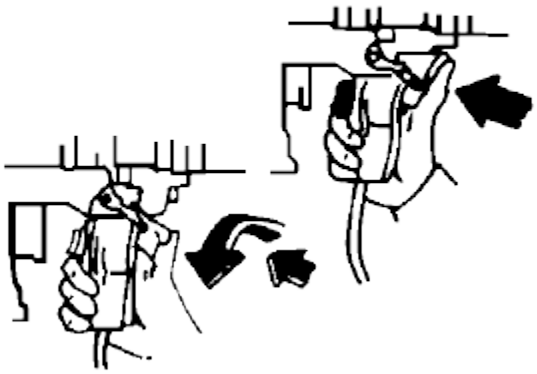


FIGURE 70. AIRCRAFT IDENTIFICATION.

FIGURE 71. TESTING THE SEEKER LOCK-ON.

6. **CONTINUE TO TRACK THE TARGET AND LISTEN FOR AN IR ACQUISITION TONE. TEST FOR SEEKER LOCK-ON BY PRESSING DOWN ON THE UNCAGING SWITCH AND HOLDING IT IN THIS POSITION.**

- If the signal is strong enough for seeker lock-on, the tone will become louder and steadier.
- If the tone is lost, release the uncaging switch and try again.
- If you cannot lock on the target, try the "Sweeping the Target" or the "Figure 8" methods (see chap 3).
- Remember, you must have IR acquisition lock-on for all targets before you can fire at them.

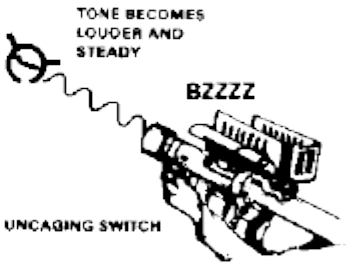


FIGURE 72. DETERMINE AIRCRAFT TYPE.

DETERMINE IF THE AIRCRAFT IS A JET OR PROP.

For Stinger engagement purposes, there are only two types of aircraft: jets and props. For props, skip steps 8 and 9.

FIGURE 73. LAUNCH RULES.

8. **FOR JET AIRCRAFT ONLY, DETERMINE WHETHER THE JET IS AN INCOMING/OUTGOING OR CROSSING TARGET.**

For jets, this decision will determine which launch rule is to be used. The gunner's horizontal body movement will aid him in determining whether the jet is on an incoming/outgoing or crossing flight path. If there is any horizontal arm or upper body movement, then it is crossing. The lack of any horizontal movement indicates that it is incoming/outgoing. Any vertical movement is also indicative of an incoming/outgoing target.

9. **FOR JET AIRCRAFT ONLY, DETERMINE IF THE TARGET IS WITHIN THE STINGER MISSILE'S RANGE.**

Apply the proper launch rule for an incoming or crossing jet to determine if the jet is within the Stinger missile's range.

LAUNCH RULES, *JET AIRCRAFT*

INCOMING — Launch when the jet image is the proper size within the range ring.

CROSSING — Launch if the jet meets the time count criteria.

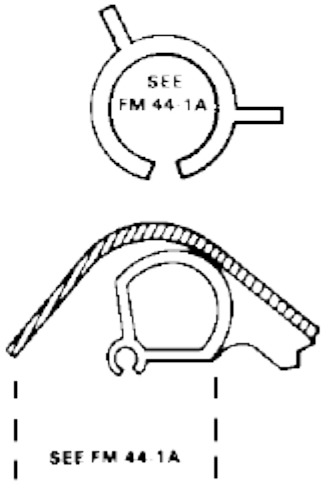


FIGURE 74. INSERTION OF SUPERELEVATION AND LEAD.

INSERT SUPERELEVATION AND LEAD. LAUNCH THE MISSILE.

Apply superelevation and lead for all aircraft by placing the aircraft image in the proper superelevation and lead reticle. This is applied in the same manner for both types of aircraft, jets and props, with one exception—*Incoming helicopters are to be placed in the left reticle.*
Remember, for props, the launch rule states.

LAUNCH RULE, PROPS

Launch when the weapon has been activated and a positive hostile ID and IR acquisition lock-on are obtained.

Learning Event 4: STINGER CREW OPERATIONS

The Stinger crew, because of the rapid pace of mobile warfare, spends a great deal of time moving, communicating, positioning, and repositioning. These and other tasks are performed under tactical conditions. This objective provides guidelines on those operations and activities which will assist you in performing your mission.

PREPARATION-KEY TO SUCCESS

For the Stinger crew to fight, it is necessary to make certain preparations. The team chief must get answers to questions such as-

- Whom does the crew support?
- To whom does the crew report?
- What are the call sign and frequency?
- Where is FAAR? What are its frequency and address code?
- What is the communications schedule?
- What are the security arrangements for the team?
- What is the threat (air or ground)?
- What are the weapons control status and state of alert?
- Where does the crew mess and refuel?
- What are the sign and countersign?
- What are the special instructions, if any?
- How will expended missiles be resupplied?
- When and where will the IFF interrogator be reprogrammed?

Note: Modify the list to fit the mission/situation.

The Stinger crew must have answers to questions about the operation if they are to be successful in battle. Whenever possible, the crew chief should make out a checklist and attempt to find the answers.

The crew chief may receive the mission either orally or in writing. The crew chief should remember the details which directly affect the crew mission. Jotting down some of the information may assist you to remember some of the details. If some important information affecting the mission is vague, ask questions about the matter.

CREW CHIEF'S PLAN

The crew chief should make a tentative plan for operation of the crew. Normally, a crew chief is given specific instructions by the section chief or sergeant, such as "Accompany company team A (indicated by map or by pointing) as soon as possible. Occupy this position as coordinates 86350115. Your crew will be close to the 3d platoon on this knoll. The weapons control status is WEAPONS FREE. Check

the position on the ground for a good primary and an alternate position. Be prepared for air attack at any time as you move up with the troops. I'll come back and check your position later."

In choosing between available positions, usually advantages and disadvantages must be weighed against each other. When compromises are necessary, how well the crew can do its mission at the position is the determining factor. Use the Position Selection Checklist when picking Stinger positions (Figure 75).

FIGURE 75. POSITION SELECTION CHECKLIST.

☐ **Good observation and fields of fire**
Positions should ideally have at least 5 km of observation and all-around fields of fire. At least, the gunner must have good fields of fire along the most probable avenues of approach of hostile aircraft.

☐ **Accessibility for team vehicles**
The position should be easy for the team vehicles to move into. Concealed routes are necessary to rear and flanks for rapid shifting of position.

☐ **Security from ground attack**
Team positions must have protection against ground attack. Two main factors to think about when positioning Stinger are--

- Position teams within or near friendly units for security.
- Protect the team from enemy ground fires. Masking between the position and the enemy hides the position from enemy ground observation.

☐ **Communications**
Positions selected must allow teams to communicate effectively. Wherever possible, direct line of sight for team communications must be obtained. If you can't communicate from your position, the position is unsatisfactory.

☐ **FAAR**
Stinger team positions should be located to receive FAAR early warning information. The TADDS is emplaced with as near a line of sight as possible to the FAAR.

☐ **Safety from backblast**
The gunner must stand up to fire the Stinger missile. Thus, his selected position should be clear of dry brush and other materials which may ignite when the weapon is fired. The gunner needs a firing position clear to fire in any direction (circular area with a minimum of 50 meters in radius). If both team members must fire, the team chief and gunner must each insure that neither one is in the backblast of the other's weapon.

Equipment must be checked for completeness and proper functioning. If changes are required, such as a radio frequency change, make sure they are done at the proper time. Sufficient rations and water must be acquired, et cetera.

The crew chief should check his map frequently to make sure he knows where he will be positioned and how he is to get there. After receiving the verbal or written order from the section chief, the crew chief briefs the gunner on the new operation. The crew chief makes sure that the gunner receives all necessary information to accomplish the mission. The soldier does a better job if he knows the situation and is kept informed.

When ordered to move out, the crews go to their designated locations and effect liaison with the commander of the supported or nearest unit. The crew chief explains the crew's mission and touches base on communications, ammunition resupply, refueling, and rations. The crew chief should coordinate with other small unit leaders for positioning (night and day), security, et cetera.

How to Select a Position

Upon arrival of the crew at the designated location, the gunner readies his equipment for action. The crew chief selects the best firing position within the area selected by the section chief. This site is the team's primary position. Terrain evaluation is a continuous process. Mission accomplishment is the prime consideration in site selection. Cover, concealment, and camouflage should also be considered when a choice of sites is available. When selecting positions, give particular attention to unobstructed fields of fire, masking clearance, and backblast area. Terrain features, which present a masking problem for employment of Stinger, are evaluated for height, distance, and direction from the firing positions. The crew chief attempts to select a position which lessens the effect of terrain masking.

The smoke signature of the Stinger missile and backblast can be expected to reveal the crew's position during an engagement. After an engagement in forward areas, the team must quickly move to an alternate position. In rear areas, where the threat of ground artillery fire is remote, the need to move quickly to another position is not as great. Alternate positions need not and should not be far from the primary position. An alternate position should be at least 200 to 300 meters from the primary position. The alternate position covers the same sector of fire as the primary position.

Time permitting, routes into and out of these positions must be reconnoitered and selected. The routes should afford cover between positions.

How to Occupy a Position

The primary task is to select the best firing position within the area assigned by the section chief and become operational. Once a position has been selected for a Stinger crew, movement to it and initial occupation are as discussed in FM 44-18. The first priority in occupying a position is preparing weapons for action. The Stinger crew must occupy its position as fast as possible. Next, the physical security of the position must be improved as required. The extent to which the crew prepares and improves a position will vary according to the mission, the length of stay, and the danger from enemy fire. Use the Position Occupation Checklist when occupying a position (Figure 76).

FIGURE 76. POSITION OCCUPATION CHECKLIST.

- ☐ Check local security.
- ☐ Prepare weapons for firing.
- ☐ Establish communications with section headquarters and with the supported unit
- ☐ Orient TADDS and plot team position on it.
- ☐ Establish FAAR netting (line-of-sight).
- ☐ Prepare additional weapons as required.
- ☐ Prepare field fortifications (prone/foxhole positions) and camouflage for team members.
- ☐ Work in alternate positions as time allows.

Note: The exact sequence of actions may vary between crews and crew members depending on the tactical situation. However, the guidelines shown in Figure 77 should be used for a hasty occupation.

FIGURE 77. HASTY OCCUPATION CHECKLIST.

GUNNER	CREW CHIEF
Remove weapons from ready racks and ready them for action.	**Check security.** Make sure your position is not out in the open and exposed to enemy ground observation or fire. Establish contact with supported unit. (Section command net.)
Search for targets within assigned search sector. The team chief and gunner take turns searching and improving position.	**Conceal vehicle.** Hide the vehicle and trailer close to the position. Continue to monitor the radio. **Establish communications.** Place the TADDS on the ground and orient it. Plot your position on it. Establish communications with the supported unit as required by your unit tactical SOP.
	Prepare additional weapons for firing as required.

Construct a prone position.
Position improvement continues while the position remains occupied. The team works on alternate positions as time allows. Some of the work can be accomplished at night. Team survivability measures including use of cover, concealment, and field fortification are covered in chapter 9.

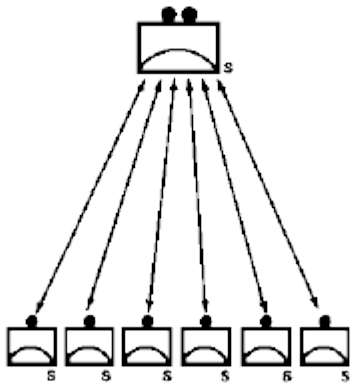
Learning Event 5: STINGER CREW RADIO OPERATING PROCEDURES

Because the Stinger crews are widely dispersed and subject to frequent and rapid moves, radio is the primary means of communication during employment. Radio nets are supple mented and paralleled by wire nets when time, the tactical situation, and security permit their use.

STINGER SECTION COMMAND NET

The Stinger crew operates in the Stinger command net. This is a two-way net between the Stinger section headquarters and the Stinger crews (Figure 78).

FIGURE 78. STINGER SECTION COMMAND NET.

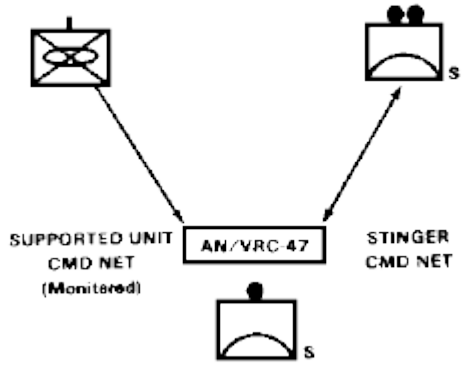


- Air defense warnings and orders.
- Movement orders.
- Command and control information.
- Any other information essential for section operations.

SUPPORTED UNIT COMMAND NET

Stinger crews may be assigned to support armored, infantry, mechanized (AIM) divisions; separate brigades; and armored cavalry regiments. Stinger crews are equipped to operate in the parent section command net and monitor the supported unit command net. Monitoring the supported unit command net keeps the Stinger crew informed of ongoing tactical operations. The Stinger crew is authorized an AN/VRC-47 (Figure 79).

FIGURE 79. SUPPORTED UNIT COMMAND NET.



INFORMATION RECEIVED

- Crew placement when in DS of a company team.

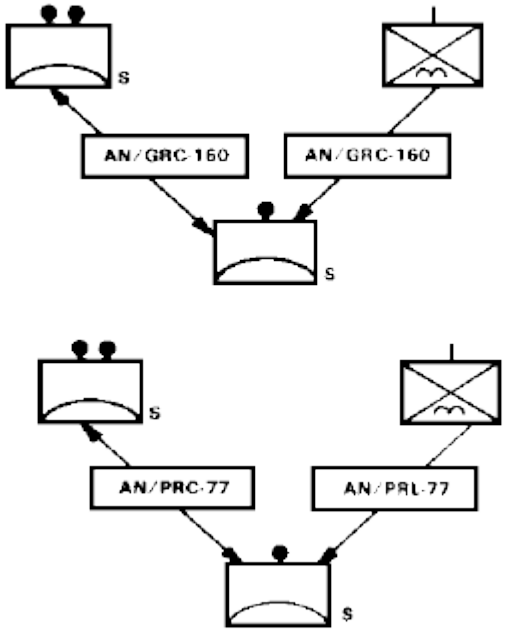
- Coordination instructions for the crew.
- Command control information.
- Logistics.
- Other tactical considerations.

Note: When the Stinger crew uses the section command net and the supported unit nets in this manner, it is receiving a great deal of information.

SUPPORT OF AIRBORNE OR AIRMOBILE UNITS

Stinger crews may also be assigned to support airborne or airmobile divisions. Stinger crews with an airborne division are equipped with two AN/GRC-160 radio sets. Crews operate in the Stinger section command net and the supported unit command net. The airmobile division's crews are equipped with the AN/PRC-77 for use in the Stinger command net and the AN/PRC-68 for use in supported unit command net (Figure 80).

FIGURE 80. STINGER CREW WITH AIRBORNE OR AIRMOBILE DIVISIONS.

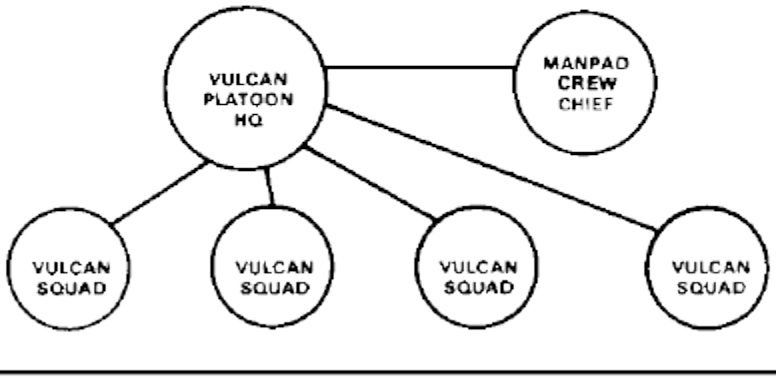


STINGER NETTING WITH VULCAN ELEMENTS

When a Vulcan platoon is in direct support of a company team also supported by Stinger, the Vulcan platoon leader, Vulcan squads, and Stinger crew(s) operate in the Vulcan platoon net. By joining the Vulcan platoon command net, the Stinger crew will receive all early warning information, changes in weapons control status, air defense warning, alert status, and other information given to the Vulcan platoon. This method ensures coordination of the air defense effort. If the Stinger section chief needs to

get information to the Stinger crew, he can contact the Vulcan platoon leader who can pass on the information (Figure 81).

FIGURE 81. STINGER NETTING WITH VULCAN ELEMENTS.

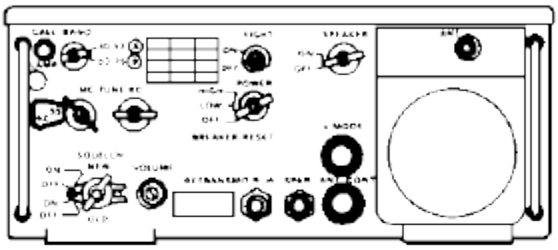


Note: Other netting arrangements with organic radios may be employed depending on the tactical situation.

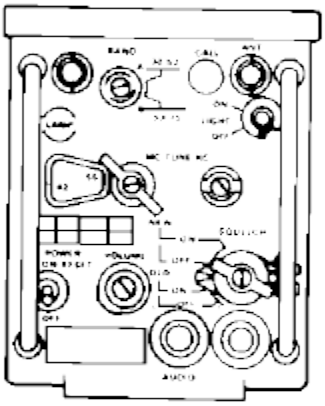
Radio Set AN/VRC-47

The basic components used with this set include a receiver- transmitter (RT) and auxiliary receiver (Figure 82).

FIGURE 82. RADIO SET AN/VRC-47.



RECEIVER - TRANSMITTER RT-524/VRC



RADIO RECEIVER R-442/VRC

TECHNICAL CHARACTERISTICS

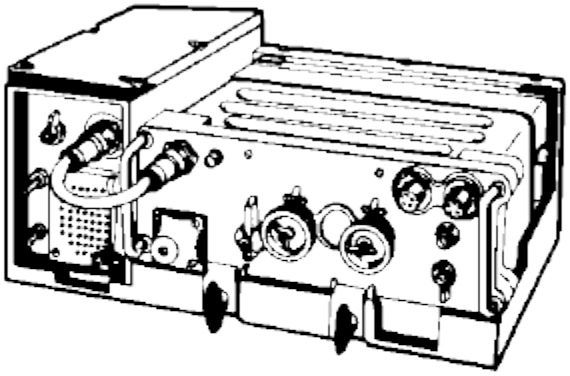
TYPE OF SERVICE	SINGLE CHANNEL VOICE
FREQUENCY RANGE	BAND A 30 TO 52.95 MHz BAND B 53 TO 75.95 MHz
PLANNING RANGE	LOW 8 Km HIGH 41 Km
REMOTE OPERATION	USES AN AN/GRA-39B

References: TM 11-5820-401-12
TC 11-4

Radio Set AN/GRC-160

Radio set AN/GRC-160 incorporates the components and operational characteristics of the portable FM radio set AN/PRC-77 and the vehicular radio AN/VRC-64. The AN/PRC-77 can be operated as a portable radio by removing it from the AN/GRC-160 vehicle mounted configuration (Figure 83).

FIGURE 83. RADIO SET, AN/GRC-160.



TECHNICAL CHARACTERISTICS

TYPE OF SERVICE	SINGLE CHANNEL VOICE
FREQUENCY RANGE	LOW BAND 30 TO 52.95 MHz HIGH BAND 53 TO 75.95 MHz
PLANNING RANGE	8 KM

Radio set AN/PRC-77

The AN/PRC-77 is a short-range, lightweight, frequency modulated (FM), fully transistorized radio set that can be manpacked and operated with speed security equipment (Figure 83).

Note: Stinger section communications are covered in FM 44-18.

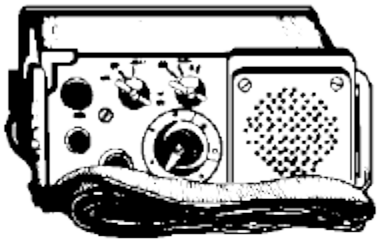
Radio Set, AN/PRC-68

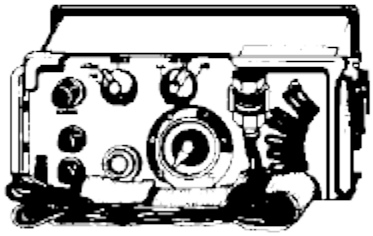
The AN/PRC-68 is a battery-operated, hand-held FM radio set. Stinger crews in the airmobile division can both transmit and receive communications on the supported unit command net. By attaching a secure voice module (SVM) to the AN/PRC-68, it is capable of operating in the secure mode.

Radio Set Control Group AN/GRA-39B

This battery-operated remote control system consists of a local control unit and a remote control unit. When connected with field wire, the AN/GRA-39B can be operated from a distance of up to 3.2 km (2 mi). By using the remote control unit, Stinger crew members can transmit and receive communications information while positioned away from their vehicles (Figure 84).

FIGURE 84. RADIO SET CONTROL GROUP, AN/GRA-39B.





TECHNICAL CHARACTERISTICS

TYPE OF SERVICE	VOICE
FREQUENCY RANGE (VOICE)	300-3,500 Hz
PLANNING RANGE	3.2 KM (USING FIELD WIRE WD-1/TT)

Communicating by Radio

The Stinger crew radio operator must be able to effectively communicate in a net. To do this, he must use radiotelephone procedures. Radiotelephone procedures must be used properly to prevent giving the enemy useful information. Radiotelephone procedures are based on the ACP 124-series. Each radiotelephone station forms part of a net in which it is connected to other stations. The net control station (NCS) maintains circuit discipline within a net. Here are a few definitions and fundamentals used for communication by radio. When operating in a radiotelephone net, all operators must observe the rules.

- Listen before transmitting to avoid interfering with other transmissions.
- Speak in natural phrases, not word by word.
- Speak slowly and distinctly at normal voice level directly into the microphone, just as you would into a conventional telephone.

Nets. The type of net is determined by the NCS according to operating conditions. The types of nets are-

- Free net. In a free net, traffic is exchanged without prior permission from the NCS. A net is deemed to be a free net unless otherwise ordered by the NCS.
- Directed net. In a directed net, stations must obtain permission from the NCS prior to conducting communications with other stations.

Call Signs. A call sign is a letter-number-letter combination assigned to a unit. Every unit in an organization has a different call sign. The complete call sign is used under the following conditions:

- When opening and closing a net.
- When entering a net in which you do not normally operate.
- When requested by NCS or any other station.
- When radio reception is poor.

Suffixes. Call sign suffixes are two-number groups assigned to positions or activities within a unit. The call sign and suffix together identify the sender and receiver of a radio message.

When the NCS is prepared to open the net, he will call the net and issue a challenge to the net.

EXAMPLE

ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-AUTHENTICATE BRAVO LIMA-OVER

The first station responds to the NCS, answers his challenge, and issues a challenge to him.

EXAMPLE

ALFA TWO DELTA TWO EIGHT-THIS IS-BRAVO ZERO FOXTROT ZERO SEVEN-I AUTHENTICATE HOTEL-AUTHENTICATE MIKE PAPA-OVER

The NCS answers to the net and issues a challenge which is answered by the next station in sequence.

EXAMPLE

ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-I AUTHENTICATE PAPA-AUTHENTICATE BRAVO FOXTROT-OVER

The remaining stations respond to the net, answer the challenge, and issue a challenge for the next station. The last station does not issue a challenge as all stations will have answered a challenge at this point.

EXAMPLE

ALFA TWO DELTA-THIS IS-CHARLIE EIGHT TANGO ONE ONE-I AUTHENTICATE LIMA- AUTHENTICATE DELTA XRAY-OVER

ALFA TWO DELTA-THIS IS-LIMA SEVEN LIMA ZERO NINE-I AUTHENTICATE CHARLIE-OVER

Should a station not answer, the next station in order will wait 5 seconds and then answer. The station that missed its turn will answer last. The NCS responds and indicates type of net.

EXAMPLE

FREE NET: ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-OUT

DIRECTED NET: ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-THIS IS A DIRECTED NET-OF WHAT PRECEDENCE AND FOR WHOM ARE YOUR MESSAGES-

Note: Authentication is not required when the net is opened for the first time of a new radio day. In a high threat area where enemy imitative communications deception has been extensive, normal authentification will be used.

When the NCS is prepared to close a net, he will call the net and issue closedown instructions.

EXAMPLE

ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-CLOSE DOWN-OVER

The first substation responds to the NCS and issues a challenge to him.

EXAMPLE

ALFA TWO DELTA TWO EIGHT-THIS IS- BRAVO ZERO FOXTROT ZERO SEVEN-AUTHENTICATE KILO GOLF-OVER

The NCS answers the challenge to the net and each station responds to the NCS indicating they have received this transmission.

EXAMPLE

ALFA TWO DELTA-THIS IS-ALFA TWO DELTA TWO EIGHT-I AUTHENTICATE DELTA-OVER ALFA TWO DELTA TWO EIGHT-THIS IS-BRAVO ZERO FOXTROT ZERO SEVEN-ROGER-OUT ALFA TWO DELTA TWO EIGHT-THIS IS-CHARLIE EIGHT TANGO ONE ONE-ROGER-OUT ALFA TWO DELTA TWO EIGHT-THIS IS-LIMA SEVEN LIMA ZERO NINE-ROGER OUT

All stations remain on the air until the last station has responded.

Radio/Telephone Prowords. Certain commonly used prowords have distinct meanings and are used to shorten the amount of time in voice communications and to avoid confusion. Use them when talking on the telephone or the radio.

- OVER-"This is the end of my transmission to you and a response is necessary. Go ahead, transmit."
- SAY AGAIN-"Say again all of your transmission."
- CORRECTION-"An error has been made in this transmission (or message indicated). The correct version is _____."
- I SAY AGAIN-"I am repeating transmission, or portion indicated."
- ROGER-"I have received your last transmission satisfactorily."

- WILCO-"I have received your last transmission satisfactorily, understand it, and will comply."
- OUT-"This is the end of my transmission to you and no answer is required or expected."

Frequency Assignments. Each radio net is assigned a frequency. These frequencies are changed by the unit communications-electronics officer and are changed when and where needed. The Stinger crew radio operator should be adept at changing radio frequencies. Refer to the technical manual covering your radio for instruction on how to do this.

STINGER CREW WIRE COMMUNICATIONS

The Stinger crew uses wire communications whenever possible. Crew positions may be interconnected by wire for local communications in static situations or during listening or radio silence. When the supported unit establishes its wire system, the Stinger crew can communicate with its section headquarters by wire. Information on how to connect your field telephone and use of field wire is explained in FM 24-20.

Members of split Stinger crews also use wire to communicate. Because only one radio and one TADDS are within the crew, the crew chief stays with the radio and TADDS. The gunner strings wire to another position, attaches the field telephone, and establishes communications with the crew chief.

Each Stinger crew is issued two telephone sets. The TA-1/PT telephone is a sound-powered telephone that provides facilities for talking and signaling without batteries. It weighs only 3.5 pounds and has a range with field wire of approximately 10 to 15 km. This telephone set can be used to advantage in forward areas, employed in switched wire networks (during periods when radio nets are closed), or as point-to-point circuits.

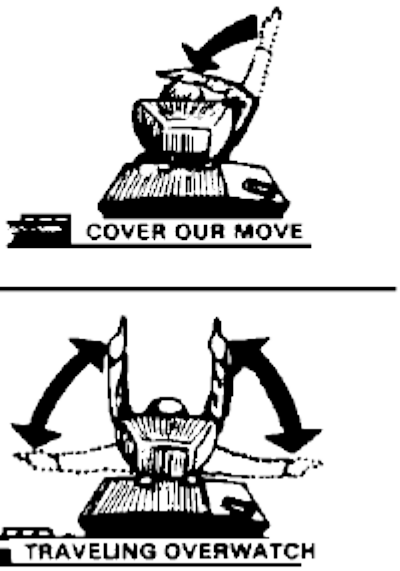
Reel unit RL-39 is a lightweight, portable, chest-type reel consisting of an axle with carrying handles, carrying straps, and a crank for rewinding. The RL-39 mounts spool DR-8-A, which has a capacity of 0.4 km (1/4 mile) of field wire WD-1/TT (wire not included as a component). This reel is normally used to lay short local circuits, up to 0.4 km, over difficult terrain or in forward areas.

Field wire is recoverable and is reusable; always take it up before you move out of a position, if the situation permits.

HAND SIGNALS IN SUPPORT OF A MANEUVER UNIT

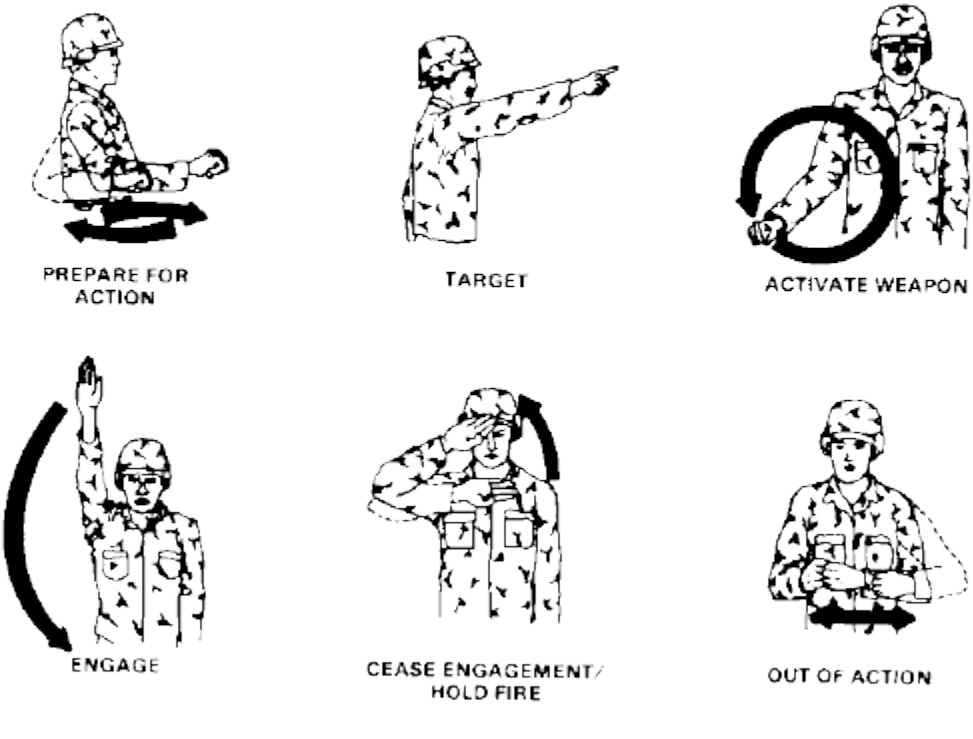
Arm and hand signals may be used by the Stinger crew members to communicate among themselves and with supported unit personnel. Arm and hand signals are useful when radio or wire is not available and battlefield noise does not permit use of voice commands. Arm and hand signals should be used only when absolutely necessary. Standards and special arm and hand signals to control small unit actions, recovery operations, and vehicle movements for the tank and mechanized infantry company team are covered in FM 71-1, The Tank and Mechanized Infantry Company Team. When Stinger crews are supporting a maneuver unit, they should be familiar with the visual signals used by leaders of the unit (Figure 85).

FIGURE 85. IN SUPPORT OF MANEUVER UNIT.



Note: Arm and hand signals for the communication of Stinger fire commands are shown in Figure 86.

FIGURE 86. ARM AND HAND SIGNALS FOR COMMUNICATION OF STINGER FIRE COMMANDS.



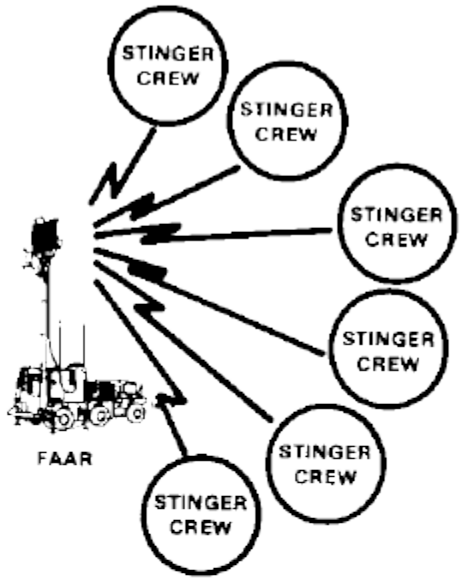
Learning Event 6: EARLY WARNING METHODS AND EQUIPMENT, FAAR/TADDS

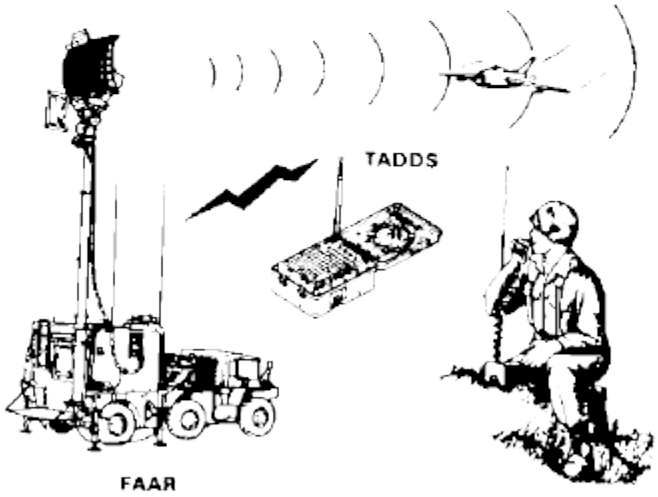
A Stinger crew may be warned of an approaching aircraft or it may visually detect the target without prior warning. Warning of the approach of an aircraft increases the chances of successfully engaging it. An alert warning will usually give the general location and heading of the aircraft and a tentative identification.

EARLY WARNING NETS

The Stinger crew may receive early warning (EW)/alert information which is broadcast over the ADA EW broadcast net. These data are received at section headquarters over the ADA EW net. In turn, section headquarters sends pertinent information to the Stinger crews over the section command net (Figure 87).

FIGURE 87. EARLY WARNING CAPABILITIES.

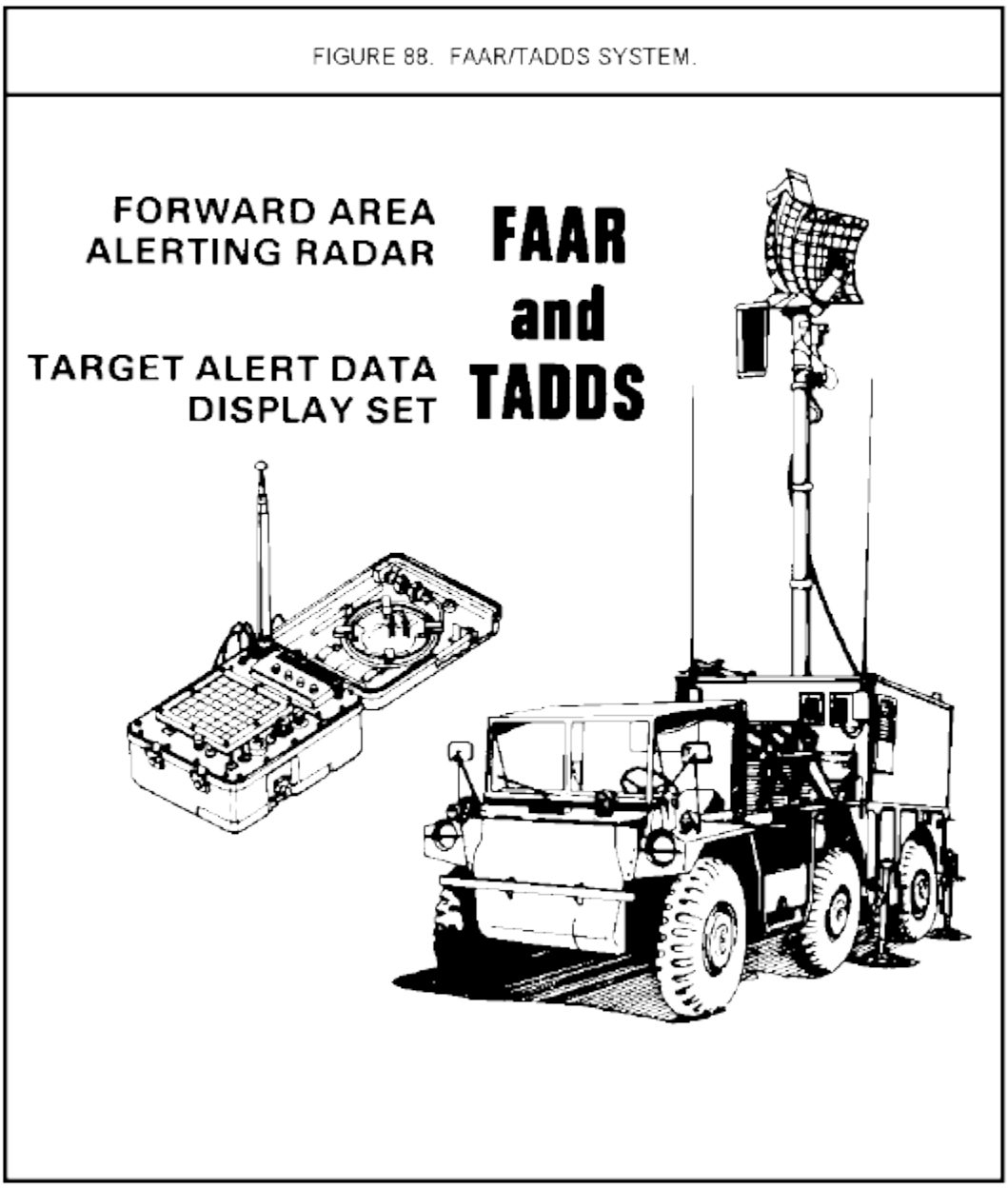




FAAR/TADDS SYSTEM

The FAAR/TADDS system is the primary means of providing alerting information to the Stinger crews. This information is transmitted by RFDL to TADDS receivers located with the Stinger teams (Figure 88).

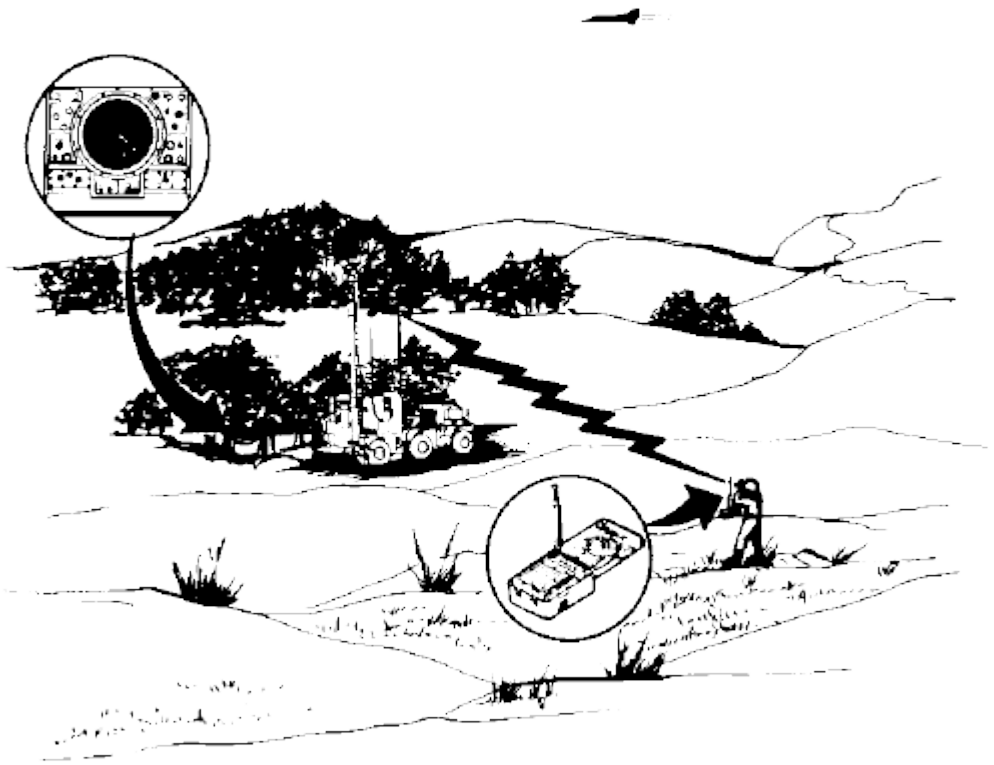
FIGURE 88. FAAR/TADDS SYSTEM.



FAAR

The FAAR system is a complete, self-contained, highly mobile radar system. It provides early warning in the form of general target location in terms of distance and direction. It also provides identification in terms of friend or unknown for each target displayed. The RFDL system provides a data communications link from the FAAR to the TADDS at the Stinger positions. The FAAR has an additional capability of passing voice radio transmissions (Figure 89).

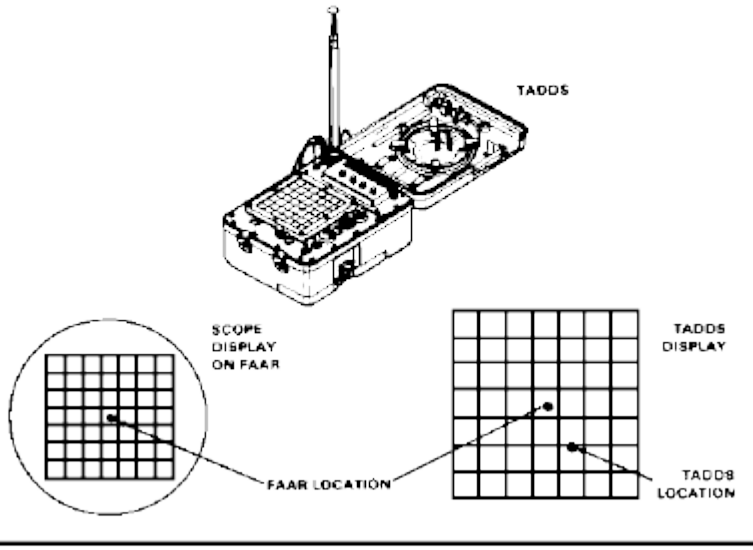
FIGURE 89. FORWARD AREA ALERTING RADAR (FAAR).



TADDS

The TADDS is a lightweight receiver which receives and displays target alert information sent from a FAAR. It displays location and tentative identification of aerial targets which are detected by a FAAR. The TADDS display consists of a grid containing 49 squares (a 7 by 7 grid). Each side of a square represents 5 kilometers. Indicators on the TADDS appear within the proper square when an encoded message is received. A green disk appears for a friend; an orange disk appears for an unknown. Either or both disks may appear in a square. If both appear, this means that at least two aircraft are in the area, one a friend and one an unknown. The TADDS also has the capability of receiving voice transmission over the RFDL frequency (Figure 90).

FIGURE 90. TARGET ALERT DATA DISPLAY SYSTEM (TADDS).



For best reception, a site for the TADDS is selected which allows as close to a clear line of sight to the FAAR as possible. It should be emplaced where a maximum signal strength reading is obtained. The key characteristic of the signal when heard from the speaker indicates that data link signals, not interference, are being received. Emplacement of the TADDS is quickly accomplished by one man. The operator performs the operational checks listed in TM 9-1430-589-12 to ensure proper operation.

Line of sight is necessary between the FAAR and the TADDS at the team location. The team chief tunes the TADDS receiver to the frequency of the nearest FAAR. If no signal is received, he then consults the communications-electronics operation instructions (CEOI) for the frequency and code of other FAARs. When he receives a signal, he requests the coordinates of that FAAR from his section chief.

After netting with the FAAR, the TADDS must be oriented to magnetic north. This is done by using the compass on the TADDS. The position of the TADDS in relation to the FAAR must be plotted. The center square of the grid represents the location of the FAAR. Stinger crew personnel, knowing the location of the FAAR and their own location, can plot and mark their position displayed on the TADDS.

When this is done, the direction and range of any target can be easily determined. The flight path of the target can be determined by observing the target disks exposed as the target progresses along the grid.

The TADDS can be operated while the crew is on the move by emplacing it on the vehicle hood or on the gunner's lap. Visually orient the TADDS to a prominent terrain feature located on your map, as metal in and around the vehicle will prevent you from obtaining a correct compass reading. As the vehicle is moving, turn the TADDS slightly to compensate for any changes in direction. An audible tone should alert the gunner to new information being displayed on the TADDS. Focus your attention on the display squares closest to the square that you are in. Any targets appearing within 5 to 7 kilometers of your position are of immediate concern to you. These targets must be identified.

Learning Event 7: RELATIONS WITH SUPPORTED UNITS

The Stinger crew chief coordinates with the supported unit commander or his representative as soon as he is given his mission. When the crew habitually supports a unit, coordination may become routine. Good relations between the Stinger crew members and the supported unit are a must. The Stinger crew chief should offer advice on air defense matters and keep the supported unit commander informed of ongoing air activity whenever necessary. While the section chief normally coordinates with the supported unit commander on team messing, resupplying, refueling, et cetera, the crew chief will have to coordinate on a local level. Keep in mind that you can keep good relations with the supported unit by observing some these do's and don'ts.

- Keep the commander informed on air defense matters.
- Do not compromise the security of the supported unit.
- Follow the movement plan carefully.
- When directed to occupy a specific position, do it as quickly as possible.
- When attached, coordinate on-site selection with the unit commander.
- Be tactful at all times.

HOW TO OPERATE AS A SPLIT CREW

A Stinger crew is best employed as a two-man crew. In certain situations, however, the crew may be split. Splitting the crew degrades command and control and the ability to detect, positively identify, and engage aircraft. If your crew has to operate in this manner, here are some points to consider.

- Split the basic load: two complete weapons and one missile-round per crew member.
- The crew chief should have access to the radio. He should relay command and control information to the gunner over the crew wire net.
- Each crew member keeps the other informed of any activity, such as when an aircraft is detected.
- When separated from the crew chief, the gunner is fully responsible for the correct identification of any aircraft which he engages.

HOW TO PROTECT A CONVOY

When protecting a convoy, Stinger personnel normally engage aircraft only if the column comes under attack. If early warning information is received via the section command net or TADDS, the Stinger crew chief relays the information to the convoy commander. After sighting or being alerted to enemy aircraft, the convoy commander alerts his vehicle commanders to the possible air attack. The convoy is then prepared to engage the aircraft with all available small arms and machine guns. The convoy commander may take one of three options with his vehicles, and order the vehicle commanders to-

- Continue the march at increased speed.
- Stop and move to the shoulders of the road.
- Disperse and seek cover and concealment.

Regardless of the option chosen by the convoy commander, the Stinger crew reacts in only one manner. When air attack is imminent, the Stinger crew moves its vehicle off the road, dismounts, and takes up

the best available firing position. This position should have good visibility and be located where Stinger can be safely fired.

Note: Stinger crews should be proficient in quick-reaction drill and mounted crew drill.

Once the crew is positioned, the crew chief bases his engagement decision on the weapons control status in effect and by applying hostile criteria. The right to fire in self-defense is never denied. The gunner engages the aircraft upon receiving the crew chief's engagement order. Ideally, the aircraft will be engaged on its first pass, before the attack run is made on the convoy. When the column is attacked, the combined fires of all available small arms, machine guns, Stinger, and other ADA weapons are directed on the aircraft. If not destroyed, the aircraft pilot will at least have his ordnance delivery impaired.

When the immediate threat of air attack has subsided, the Stinger crew notifies section headquarters of the attack, missile expenditure, and any other information required by the local SOP. The crew rejoins the convoy, passing other vehicles as necessary to resume its assigned position.

Stinger crews may be pre-positioned at critical points along the Convoy's route. This method of employment is used when a slowdown, halt, or congestion of the convoy is likely at a critical point. These critical points, such as road junctions, bridges, and refueling points, provide prime targets for threat air strikes. Pre-positioning is used when the distance to be travelled is short (for example, 5 km) or when circumstances permit the crews to blend into the column after it passes the critical point. Sufficient time must be available for the crew to move ahead of the convoy and occupy its position prior to the convoy passing the critical point.

The crew chief selects a suitable crew position that affords an early engagement capability. This means that the position should be at least 1 to 2 kilometers away from the critical point, in the expected direction of air attack. If other Stinger crews are available to defend the critical point, they will be approximately 2 to 3 kilometers away from you to ensure overlapping fires. Other requirements described earlier in this lesson should be considered in selecting a position.

HOW TO SUPPORT A MANEUVER UNIT

When the Stinger crew is supporting a maneuver unit, positioning of the crew is very important. Two methods can be used:

Deployed Behind Maneuver Units

When deployed to its rear, the Stinger crew follows the unit by successive movements. Crews should remain approximately 500 meters behind the maneuver unit. The section chief has positioning authority of crews with this mission. He selects crew positions and gives special instructions for engagement and sectors of fire. The crew may be allowed to select the fastest and easiest route between positions rather than moving with the supported unit. The crew chief must coordinate closely with the supported unit in this type of maneuver. Without this coordination, the maneuver unit may outrun its Stinger air defense protection.

At each successive position, the crew chief selects the best position on the ground to accomplish the mission. The crew chief should be alert to displace at the same time as the maneuver unit. In position,

the crew should place the vehicle under cover and conceal it as much as possible. The crew should then look for a good firing position not too far from the vehicle. By connecting field wire between the vehicle radio and the AN/GRC-39B, the crew chief can maintain communications while away from his vehicle. The position may be as far as 3.2 km (2 mi) away from the vehicle. He should also emplace the TADDS immediately so that the crew can receive an alert warning. Another consideration is safety. Be sure that no other troops or equipment are within the backblast danger area of the firing position.

The crew chief will have to use his judgment on how many weapons will have to be off-loaded. If the stay is just for an hour or less, it should be safe to have about two weapons and one or two missile-rounds immediately available. The ideal situation is to have two weapons and two missile- rounds immediately available and the remainder of the basic load readily accessible.

The crew should always be ready to defend the supported unit. However, there are times when the unit is more vulnerable to air attack. This is when Stinger crews should be most prepared against surprise attack. An example is when the unit is in an assembly area.

Deploy the Crew with the Formation

Maintaining all-around observation and fields of fire, as well as maintaining communications, will be difficult. The crew should be able to communicate with the section headquarters and the supported unit. In addition, the crew should be able to receive early warning information at any time. When positioning-

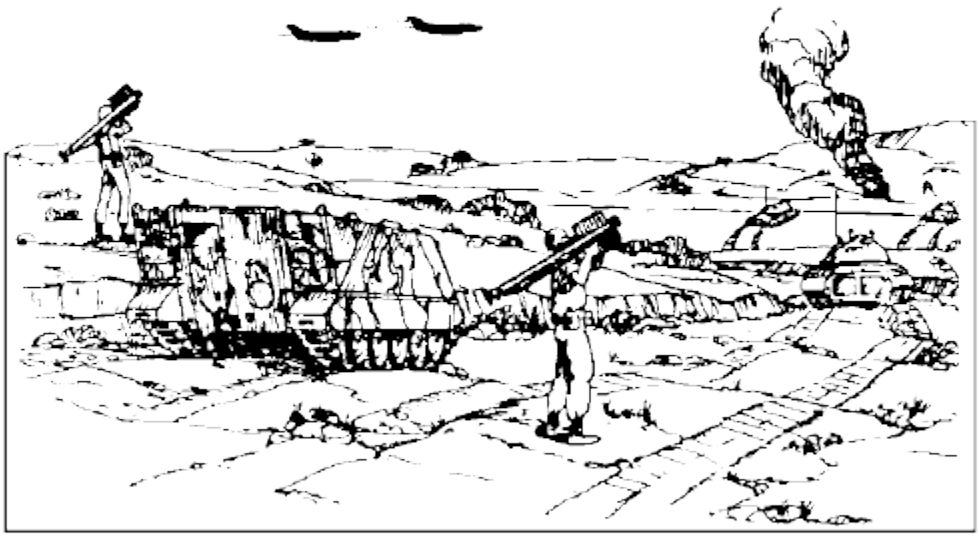
- Select positions on high ground, but do not silhouette on the skyline.
- Use cover and concealment to reduce the effects of enemy ground fire.
- Remember backblast safety requirements.
- Move to an alternate position immediately after firing if the tactical situation permits.
- Watch constantly for aircraft, including ATGM-armed helicopters.
- Move when the supported unit/element moves, unless directed otherwise.

When the Stinger crew is in support of a maneuver unit, usually a company team, it moves with the unit. The company team commander has positioned the Stinger crew in direct support of his unit and gives special instructions for firing. Usually, the Stinger crew in direct support of a maneuver unit remains with the overwatch element. The crew occupies the best position available.

The Stinger crew may have its own transportation or be mounted on a tracked vehicle on a share-a-ride basis. If the crew is mounted and traveling when warning of an air attack is received, it dismounts from the vehicle as quickly as possible. The crew immediately takes the best firing position available. If the crew is mounted on a shared tracked vehicle, reaction time (dismount to prepared to fire the weapon) will be reduced. When the crew is in a firing position on the ground, it can react much faster to air attack.

To communicate with section headquarters, the Stinger crew, mounted on a shared tracked vehicle, will have to relay information through the supported unit (Figure 91).

FIGURE 91. CREWS WITHIN THE FORMATION.



Reduced visibility during the hours of darkness will limit the intensity and effectiveness of enemy air attack. Low level attacks by threat aircraft can be expected. At night, however, the air threat is not as great. This is particularly true in the forward area where frequent movement of forces complicates the enemy's ability to see his targets (Figure 92).

FIGURE 92. NIGHT OPERATIONS.

If an attacking aircraft is seen, it can be engaged. The difficulty encountered in visually identifying aircraft during periods of darkness and inclement weather handicaps, but does not eliminate, nighttime use of Stinger for air defense. Therefore the Stinger crew should generally not attempt to engage hostile aircraft at night if those aircraft are not attacking the asset they are defending. Visual detection, visual identification, and determining range ring size are difficult, if not impossible. Stinger can be used under two conditions-

- In a self-defense role when the supported unit or asset is under air attack.
- If a weapons free status is in effect.

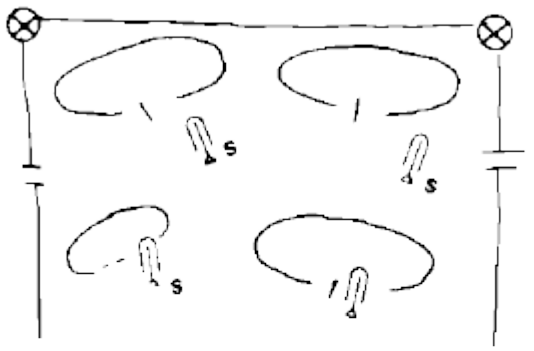
Aircraft detection and acquisition may be aided by early alerts, engine sounds, reflected light, moonlight, enemy flares, and engine exhaust flames. For targets above the horizon, use the figure 8 method. For targets below the horizon, use the sweeping method. These methods are described in Lesson 1, Learning Event 4. When you have achieved IR lock, proceed with the engagement as in the daytime.

The launch of a Stinger missile is easily detectable at night. Enemy forces on the ground may well be able to determine your position on the ground. Although Stinger crews normally move to alternate positions after each engagement, enemy suppressive fire may force the supported unit to move. For this reason, Stinger crews normally respond only to direct attack on the asset they are defending at night.

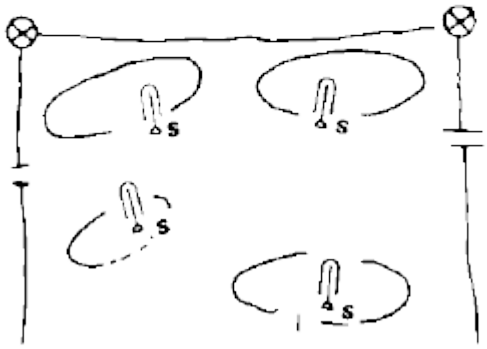
STINGER CREW SECURITY

Stinger crews supporting a unit that is moving during the night or during times of reduced visibility, normally move with the unit, remaining within the unit's formation for security. Crews supporting a unit in position at nightfall, move to positions within the perimeter of the supported unit for better security against ground attack. The section chief will tell the crew when and where to displace at night. However, the crew chief should closely coordinate with the supported unit commander on the exact location of the position. The selected positions should not compromise the commander's plan for defense of his unit. An example of day-night positioning is shown in Figure 93. Binoculars are far superior to the naked eye in daytime, and at night when ambient light (moonlight, flares, searchlights, et cetera) exists. The crew chief should use binoculars to assist the gunner to find the aircraft. TC 44-30 tells you how to use them.

FIGURE 93. DAY/NIGHT POSITIONS.



DAY DISPOSITIONS



NIGHT/REDUCED VISIBILITY DISPOSITIONS

STINGER IN DEFENSE OF ADA UNITS

Stinger crews are allocated to ADA units to provide self- defense protection. This need has developed because of the improved capability of threat forces to destroy our ADA units. Stinger can be relied on to protect these ADA units when they are displacing, traveling in a convoy, emplacing, and refueling, or during other critical periods that make the units vulnerable to air attack. This learning lesson discusses how Stinger can be employed to protect these ADA units from enemy air attacks.

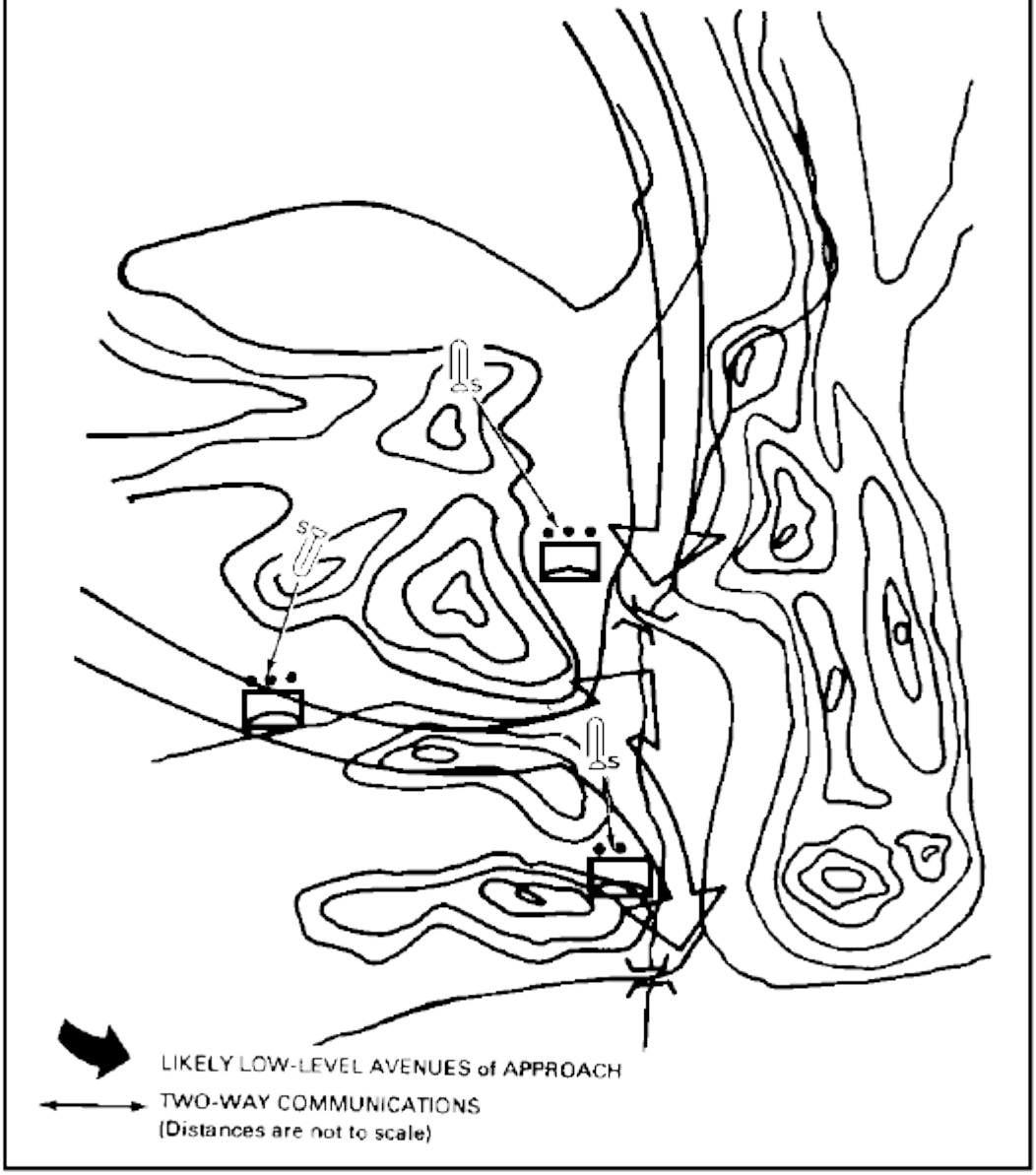
HIMAD

High-to-medium-altitude air defense (HIMAD) units, such as Nike Hercules and Hawk, can no longer expect the relative security previously provided by their rear area locations. Threat forces now have the ability to launch aircraft in great numbers that would soon saturate ADA defense. These aircraft would then be able to penetrate to the HIMAD units in the corps and theater areas. Stinger can be used by these units to provide protection from these mass air attacks.

Stinger is used by HIMAD units to compensate for system limitations (for example, Nike Hercules is not designed for low-altitude air defense coverage). Stinger can be incorporated into their defense to counter this low-flying aircraft threat. HIMAD radar systems are vulnerable to ECM. Since Stinger is not a radar-directed missile system, it does not fall prey to ECM tactics. Another advantage in

positioning Stinger with a HIMAD unit is that Stinger can be used to engage threat aircraft before they enter the HIMAD system's dead zone. Stinger's head-on engagement capability can be effectively used to provide this needed close-in protection for the HIMAD unit. In effect, by adding Stinger, the HIMAD unit is allowed to concentrate on its primary mission-HIMAD (Figure 94).

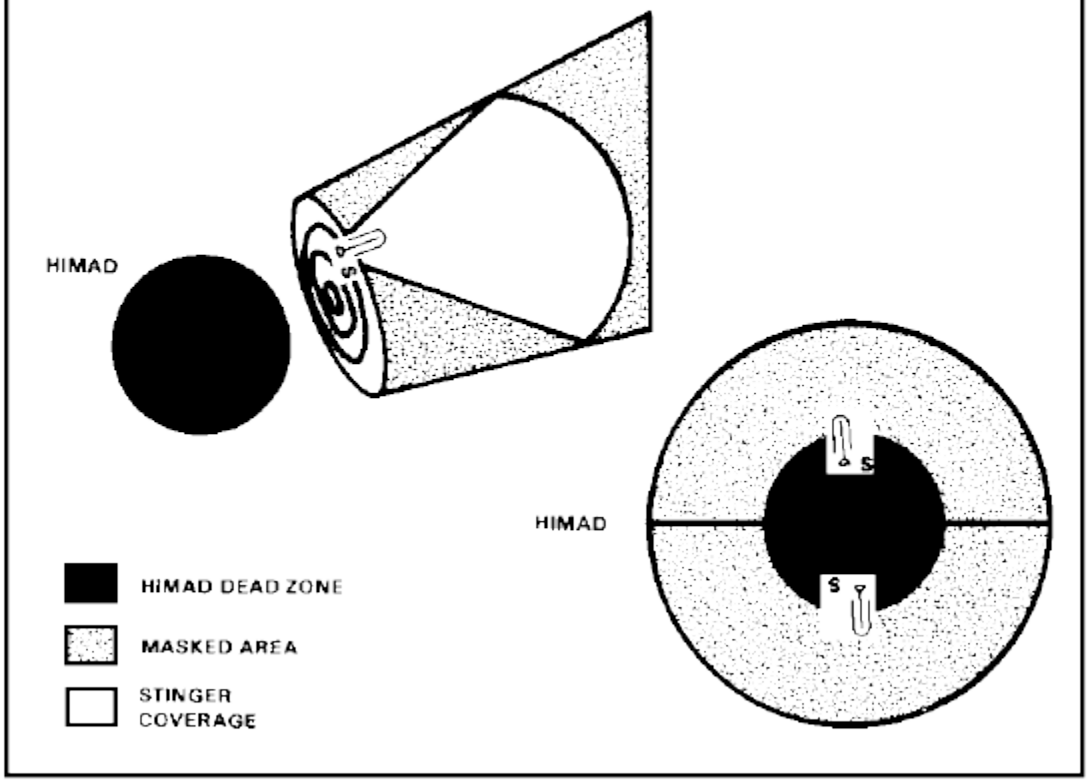
FIGURE 94. LOW-LEVEL AVENUES OF APPROACH.



The Stinger crews should be positioned along avenues of approach likely to be used by enemy aircraft. Early engagement positions should be far enough away from the HIMAD site to ensure that threat aircraft are engaged before they reach their bomb release point (Figure 94). The crew may be positioned to cover an area that is masked by terrain features, and is "unseen" by HIMAD radars. In this situation, the Stinger crew is positioned within the masked area. The position selected should allow

you to have a good observation. If possible, this position should also allow you to see the HIMAD unit. In this way, you can see attempted air attacks from other directions. On flat terrain, Stinger crews are placed opposite each other on the site's perimeter. This will allow 180o coverage by each crew. Used in this way, Stinger can engage aircraft before they enter the HIMAD dead zone. Stinger crews cannot operate in isolated positions indefinitely. They must be supplied with rations, water, and other supplies. Crew chiefs should coordinate with the HIMAD unit for these items (Figure 95).

FIGURE 95. HIMAD DEAD ZONE, MASKED AREA.



Stinger personnel in Hawk units usually receive their rules of engagement and firing instructions directly from the tactical control officer (TCO). By marking Stinger crew positions on their plan position indicator (PPI), Hawk personnel can monitor approaching aircraft not engageable by Hawk, and alert the Stinger crew. In this way, some early warning can be given to the Stinger crews for those aircraft using terrain masking to avoid being engaged by Hawk systems. Stinger personnel in Nike Hercules units may receive some guidance from the battery control officer (BCO) through his battery control station. Normally, crew personnel will operate in accordance with their battery's tactical SOP.

Since Stinger will be used primarily to engage undetected aircraft approaching the Patriot site, it is unlikely that Stinger crew members will receive any early warning information from the BCO. Usually, the AN/PRC-77 radio will be for communication with HIMAD unit. However, wire communications can also be used. Crews can be linked by wire with the HIMAD control vans.

STINGER WITH CHAPARRAL UNITS

When employed with Chaparral Units, Stinger can be used for self-defense, augmentation of a defense, or as a substitute weapon. As a self-defense for a Chaparral unit, Stinger can be used to cover a nonoperational fire unit. In augmenting a Chaparral defense, the Stinger crews nay be used to provide low-altitude coverage to areas inaccessible to the fire units. Stinger can be used as a substitute weapon for Chaparral because of the similarity in the two missile systems effective ranges.

In a self-defense role, Stinger protects exposed Chaparral fire units. One example of this is when a Chaparral fire unit is emplaced, but is not completely masked by hilly terrain. A threat attack helicopter, using a pop-up tactic can rise behind the terrain and fire at the Chaparral fire unit. The Stinger team in this instance can be positioned on the other side of the hill to counter such an attack.

Stinger can be used to augment Chaparral's defense of a critical asset. The crews are positioned to cover vulnerable areas in the low-altitude defense. These vulnerable areas are formed because of the limited number of Chaparral units allocated to the critical asset's defense. The areas can be formed by surrounding terrain features which may deny access to Chaparral fire units. For example, Stinger crews can be positioned on steep hills that the Chaparral fire units cannot climb.

Stinger provides continuous air defense coverage while the Chaparral fire unit is nonoperational. This may occur during rearming, refueling, maintenance downtime, or for other reasons. Since the effective range of the Stinger missile is close to that of the Chaparral missile, the Stinger system can temporarily replace the chaparral system. It is also during these vulnerable periods that Stinger can be utilized as a self-defense weapon. When employed in these situations, the Stinger crew should be positioned as close to the fire unit as possible, observing safety restrictions.

When Chaparral elements are displacing to another location by Convoy, they are vulnerable to air attack. Stinger must be used to protect these elements on the road. Stinger's quick reaction time can be most valuable to the Chaparral units at this time. Stinger crews supporting an ADA unit in convoy are integrated into the march column. They are positioned at each end of the march column to take advantage of the Stinger missile's head-on engagement capability.

When Stinger crews are deployed away from Chaparrel fire units, the crews must establish telephone communications with the nearest fire unit. Information is then relayed to the crew by personnel at the fire unit. If the Stinger crew is collocated with the fire unit, the radio and TADDS of the fire unit should be used.

SURVIVAL ON THE BATTLEFIELD

Unless the airspace over the battlefield is denied him, the enemy will attack and harass our ground forces from the air. It is the job of the Stinger crew to help deny the enemy use of this airspace. As a result, enemy air and ground forces, supported by sophisticated intelligence gathering and weapon systems, will be dedicated to air defense suppression in an effort to win control of the airspace. The answer to survival on the battlefield is to become invisible and undetectable. This objective describes the techniques and procedures which you must use to survive on the battlefield.

Natural cover (ravines, hollows, reverse slopes) and artificial cover (foxholes, trenches, walls) protect you from fire. The battlefield provides cover such as rubble, abandoned equipment, and craters. Even the smallest depression or fold in the ground will give you some cover. A 6-inch depression may be enough to save your life under fire. Form a habit of looking for, and using, every bit of cover the terrain offers. Proper use of the terrain is the key success for all tactical operations. This means using cover and concealment (Figure 96).

FIGURE 96. COVER--PROTECTION FROM ENEMY WEAPON FIRE.

Note: This fire includes bullets, fragments, flame, nuclear effects, and biological and chemical agents. Cover will also provide protection from enemy observation. It may be natural or artificial.

Concealment

It is concealment-natural or artificial-that hides or disguises a soldier, vehicle, position, equipment, or route. Concealment includes not only camouflage but also light, noise, movement, refuse, and odor discipline. Well-concealed vehicles and fighting positions will deceive the enemy as to the crew's location. Natural concealment is provided by your surroundings. The best way to use this natural concealment is to leave it undisturbed as you move into an area. Against an enemy who has night vision and other detection devices, darkness will no longer conceal you. To supplement natural cover and concealment found on the battlefield, the crew must be proficient in camouflage.

Camouflage

Camouflage is taking advantage of the natural environment as well as using natural and artificial materials. Used properly, it will disguise the Stinger crew and minimize the possibility of detection and identification by the enemy. If camouflage is required, plan to get it from areas other than your crew's position. Camouflage can be made from branches, bushes, leaves, and grass. Attach this material to your vehicle with old communications wire. Live foliage for camouflaging is best, because dead foliage and artificial materials may not blend in well with the natural surroundings. Make use that the vegetation matches what is naturally in your area. Detailed camouflage techniques are found in FM 5-20. Pattern paint your vehicle; TC 5-200 tells you how. Camouflage nets are excellent if sited properly.

A vehicle in an open field under a camouflage net is easily seen (though it may not be identifiable). That same vehicle between two trees under a camouflage net will probably not be seen. The lightweight screen system (LSS) is described in TRADOC Bulletin No. 6 and TM 5-1080-200-l0. Each Stinger crew is authorized an LSS by table of organization and equipment (TOE). A well-sited, pattern-painted vehicle will have its camouflage improved by erecting the LSS. The LSS further reduces visibility. The LSS also defeats radar by scattering and absorption. Stainless steel fibers in the plastic garnish material absorb some of the radar signal and reflect most of the remaining signal in all directions. The result is only a small percentage of the signal returns to the radar for detection.

Fortify Your Position

Use of field fortifications reduces damage to materiel and injury to Stinger crew members. The Stinger crew fortifies its position to the extent possible. With the short period of time the crew usually remains in a position and only two crew members to do the work, construction of fortifications is limited. Fortifications are started as soon as practical upon arrival in a new position and are improved throughout the crew's stay in that position.

Dig In. Individual prone shelters (foxholes) are constructed by each crew member (Figure 97). The soldier begins a foxhole as a hasty position for basic protection. As time permits, he improves the foxhole by completing these tasks-

- Digs the hole deeper.
- Builds a protective barrier if natural cover is not available.
- Finishes clearing fields of fire.
- Builds overhead cover.

FIGURE 97. FOXHOLES.

WARNING

Do not fire Stinger from a foxhole.

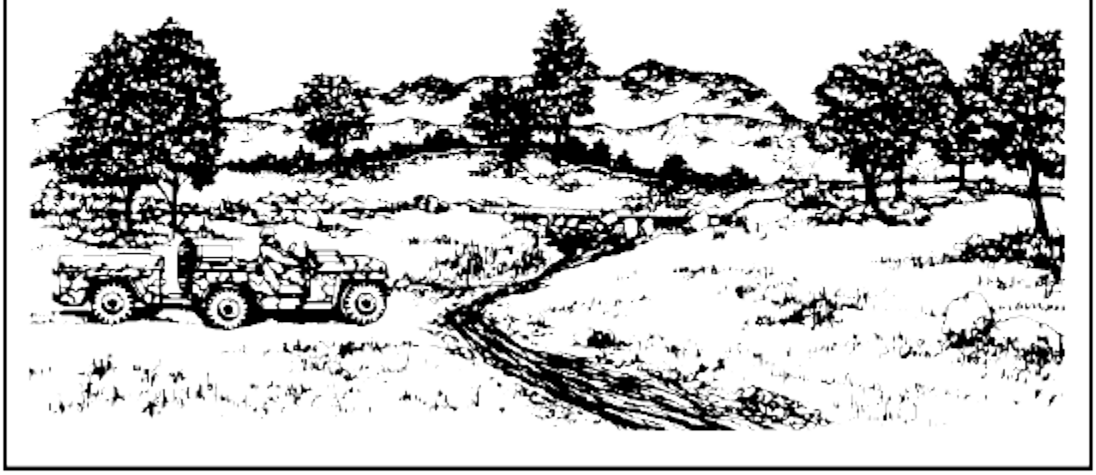
Avoid Detection. Although it is unlikely that the Stinger crew will have to fight enemy infantrymen, the protection afforded by the foxhole will be greatly appreciated if enemy artillery or rocket fire is received on or near the position. Select positions that are out of sight of enemy ground observation (for example, the reverse slope of a hill rather than its crest). The same barrier to enemy observation also provides a barrier to enemy direct fire. Look for areas that provide natural protection. Terrain irregularities (such as defiles or mounds) provide initial fortifications that can easily be completed with sandbags or other fortifying material. Obtain dirt that is some distance away from the position to construct your fortifications. Camouflage the fresh dirt to prevent pointing out the position. Field fortifications should complement camouflage, not degrade it. FM 7-7, The Mechanized Infantry Platoon and Squad; and TRADOC Bulletin No. 9, Infantry Fighting Positions, tell you all about foxholes.

Survival Measures

In addition to digging in and avoiding detection, the following measures will help you to survive.

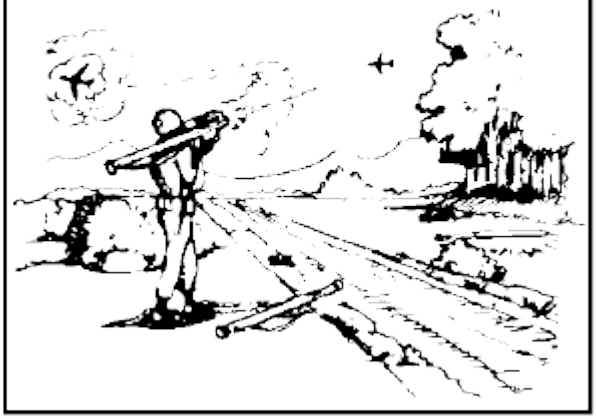
One of the best ways to survive is to keep the enemy confused as to the location of Stinger. Move often. When changing positions, it is not necessary to move far. Alternate positions can be selected within a short distance (at least 200-300 meters) from the primary position and occupied as required. The movement should be as rapid as possible so that the crew is again ready to engage enemy targets (Figure 98).

FIGURE 98. ALTERNATE POSITIONS.



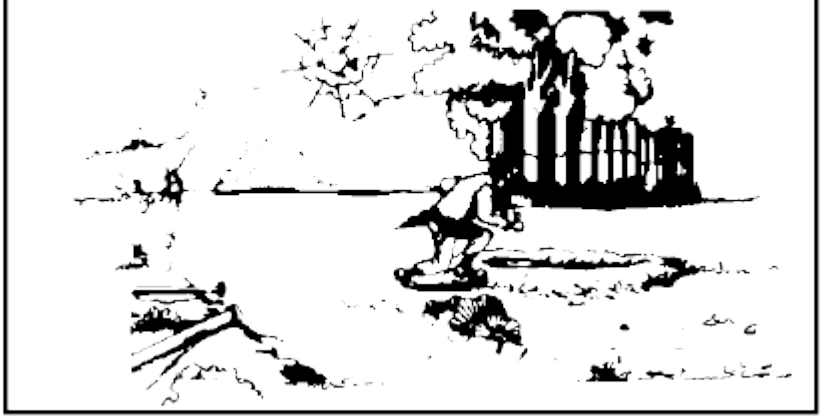
Continue to engage any other enemy aircraft. However, if there are no other enemy aircraft to be engaged, move to an alternate position as quickly as possible (Figure 99).

FIGURE 99. AFTER FIRING.



In forward areas, you should move quickly so you can stay alive to fire again. Enemy artillery or ground forces may see the missile signatures and locate your position (Figure 100).

FIGURE 100. AFTER ENGAGEMENT.



Local Security Against Ground Attack

Stinger crews are usually deployed behind the forward edge of the battle area (FEBA). They maintain close coordination with maneuver units and must depend on the supported unit for protection against ground attack. At night and during foul weather, Stinger crews should move into positions within a unit's defense perimeter. When Stinger crews are outside of the defense perimeter, they are vulnerable to attack by guerrillas and other enemy elements operating behind friendly lines.

Communications Security

Conmunications security (COMSEC) denies or delays unauthorized persons from gaining information of value from monitoring communications. Preventive electronic counter-countermeasures (ECCM) are used by the Stinger crew to accomplish this purpose. These ECCM measures include-

- Using authentication to ensure that the other communicating station is authorized.
- Assigning and changing frequencies and call signs to conceal identification and disposition of tactical units.
- Restricting the use of radio transmitters.
- Enforcing net discipline and ensuring proper radio- telephone procedures. All stations operating within a net must use authorized prosigns and prowords and limit transmission to official traffic.
- Selecting a radio site with a hill or other obstacle between it and the enemy.
- Organizing messages before transmission to reduce transmission time.

Stinger crew personnel can expect that the enemy will attempt to disrupt its radio communications through an intensive jamming effort. Jamming is the deliberate radiation of energy to prevent or degrade the receipt of information by a receiver. It is the deliberate production of interference to your radio. You can liken it in a sense to static on a TV set. The static interferes with the receiver, in this case, the TV set, but does not interfere with the transmitter. Antijamming procedures used by the Stinger crew include-

- Recognize jamming. If interference is heard, do not immediately assume jamming. Symptoms of jamming are often similar to other types of radio interference. Try to determine what is causing the interference. Disconnect the receiver antenna to see if a signal is being generated internally by the receiver. If the interference decreases with the antenna removed, the interference is probably external and may be jamming.
- Continue to operate. Radio operations should continue in a normal manner once jamming has been identified. This is to prevent the jammer from learning the effect of his jamming.
- Reduce transmit power. Transmitting on low power reduces the opportunities for the enemy to hear the transmission. Use only enough transmitter power to be heard within the net but not enough to be heard by the enemy. Some radios (for example, AN/PRC-77) do not have multiple power settings. To reduce power, the radiation pattern must be modified. This can be easily done by carrying the radio upside down with the antenna tip a foot above the ground. This technique will usually provide a good strong signal within a radius of 5 kilometers.
- Change frequencies. As a last resort and when authorized, change to an alternate frequency.
- Report jamming. As soon as jamming is recognized, a report should be sent to the next higher headquarters. Use an alternate means of communication for this report. A jamming report format is included in the CEOI or your unit tactical SOP.

Light Discipline

During periods of reduced visibility, any light (even filtered flashlights and burning cigarettes) can be seen for great distances. At such time the use of lights must be strictly controlled. Lights needed for maintenance and other activities must be shielded from enemy view.

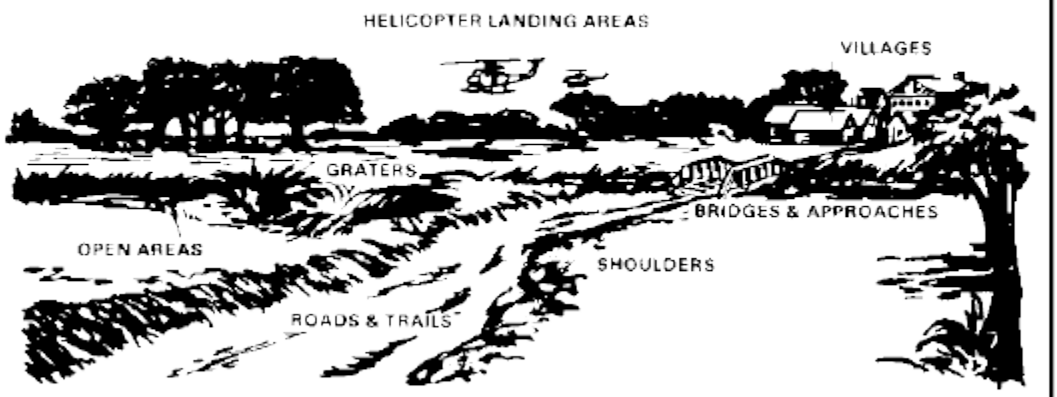
Noise Discipline

Soldiers must talk and move only when necessary. At night, it is particularly important to talk in a low voice and to move slowly. Do not slam hatches or doors on armored vehicles. Do not start or move the team vehicle unless it is part of a plan or tactical operation.

Enemy Mines

Every soldier should be aware of the destructive potential of enemy mines. Mines can inflict severe injury to troops and heavy damage to vehicles and equipment. They can effectively prevent troops from entering certain areas and channel them into areas with concentrated enemy fire. Supply lines may be disrupted and convoys forced to bunch together due to damaged vehicles. Stinger crews supporting maneuver units frequently find themselves along in unfamiliar areas. Their chances of finding enemy mines are increased. For this reason, crew chiefs and gunners should take protective measures, be aware of likely mine locations, and be able to recognize the telltale signs of enemy mines (Figure 101).

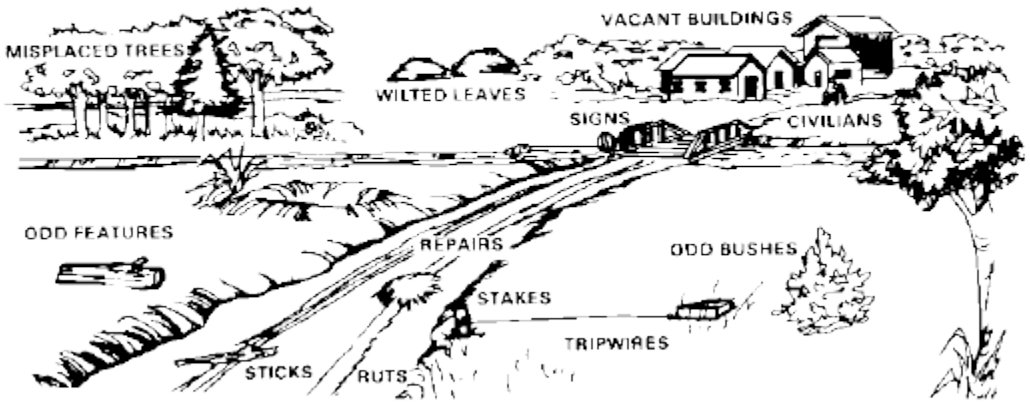
FIGURE 101. POSSIBLE MINE LOCATIONS: WHERE TO LOOK.



Signs indicating possible mine locations include but are not limited to-

- Mud smears, grass, sticks, dirt, or other unusual material on roads.
- Fresh asphalt or other signs of road repairs.
- Markers, stakes, or other signs used to identify certain areas.
- Wires leading away from roads.
- Dead vegetation in small or scattered areas.
- Civilians avoiding certain areas.

FIGURE 102. POSSIBLE MINE LOCATIONS: WHAT TO LOOK FOR.



Stinger personnel should avoid suspected mined areas and move to a nearby position to accomplish their mission. If, however, your team encounters a mined area, do not panic. Notify your next higher level of command immediately, as specified in your unit SOP. Probing for mines is a tedious process and should not normally be attempted by Stinger personnel. DO NOT probe for mines with metallic objects, as some mines are triggered magnetically. Additional information on mine warfare is contained in FM 20-32, Mine/Countermine Operations at the Company Level.

Other Survival Measures

Unit SOP prescribes specific warning signals for ground, air, air assault, and nuclear, biological, chemical (NBC) defense. The signals must be understood by all personnel. Periodic rehearsals and drills are conducted to ensure that the signals are understood and that the method of dissemination works. How Stinger crews survive an NBC attack is dependent on the degree of NBC training and availability and proper use of protective equipment. The nature of NBC operations may cause untrained soldiers to panic at the first sign of an NBC attack.

REMEMBER

- Stay alert-see the enemy first. Seeing him first gives you the edge in the engagement. Do not lose sight of him.
- Select a position that is hidden from enemy ground observation.
- Move into positions during darkness.
- Take advantage of terrain to provide cover and concealment for the weapon.
- Do not expose anything that shines. Reflection of light from a shiny surface attracts attention and can be seen for great distances.
- Use garnish netting, pattern painting, and natural materials to camouflage the position.
- Blend equipment into natural background.
- Erase and cover tracks.

- Keep position litter-free. Be sure to replace dunnage (packing material) and barrier bags from the MRC into the container after the missile-round has been removed.
- Report detected mines immediately to the next higher level of command in accordance with unit- SOP.

Learning Event 8: MOBILITY AND COMBAT LOADING

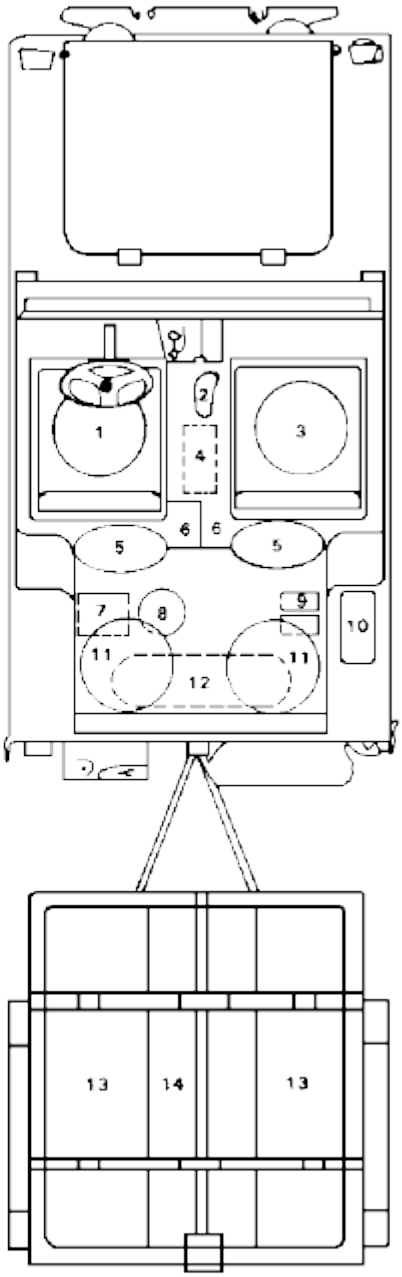
In addition to being able to shoot and communicate, the Stinger crew must also be able to move. Because the Stinger weapon is a man-portable air defense missile system, both vehicular and dismounted march deployment must be considered. This objective discusses mobility, vehicular combat loading, and dismounted march loads in which Stinger team personnel should be proficient.

CREW MOBILITY

Normally, the Stinger crew uses its own transportation to carry its basic load of weapons and team equipment. The Stinger basic load fits easily into the crew's organic 1/4- ton trailer. In general, the vehicles carry shipping and storage containers in the trailer with all TOE items carried in the truck. The 1/4-ton truck and trailer provide limited mobility in the forward areas (Figure 103 and 104).

FIGURE 103. STINGER CREW MOBILITY.

FIGURE 104. LOADING PLAN FOR VEHICLE.



1 CREW CHIEF
2 BINOCULARS
3 GUNNER
4 TADDS
5 PACK (2)
6 PROTECTIVE MASK (2)
7 IFF
8 WIRE REEL*
9 TELEPHONE (2)
10 RADIO
11 SLEEPING BAG (2)
12 DECONTAMINATION KIT
13 WEAPON-ROUND (40
14 MISSILE-ROUND (2)

*Under rear seat if decontamination kit leaves sufficient space.

Note: Crews assigned to the airmobile division are not equipped with a vehicle.

During mobile operations with mechanized forces, Stinger crews may not be able to keep up with their supported unit; for example, a company team. Also, Stinger crews may be vulnerable to hostile ground fire. When Stinger crews are to support a mechanized element, the maneuver commander may provide crews with tracked transportation; for example, an armored personnel carrier(s) (APC). The Stinger crew may have to share a ride with other troops in the APC. Changing the mode of transportation of the

team includes providing space for the basic load of Stinger weapon-rounds. Also, space and power must be provided for the crew's radio. If the crew shares a ride with an infantry squad, there is insufficient room for the complete basic load. The load may have to be split into several carriers (refer to FM 44-18 for details).

MANPACK STINGER LOAD

The Stinger crew sometimes dismounts to support maneuver elements in difficult terrain. The crew chief must coordinate with the supported unit commander to solve the problems of carrying Stinger and guarding Stinger equipment left behind (see Figure 108). The crew is limited to carrying only two Stinger weapons. In addition, a crew radio manpacked), extra BCUs, individual weapons, binoculars, et cetera, must be carried. The amount of equipment crew members must carry limits their range and mobility during dismounted operations. Weights may vary according to what items are carried. Under these conditions, it is essential that weight be minimized and the load balanced. Multiple sling loads are difficult to carry for extended periods. Both Stinger and the M16 rifle are sling-carried weapons (see Figures 105 and 106 for sample Stinger march-load and weight distribution allocations).

FIGURE 105. MANPACK STINGER LOAD.

FIGURE 106. MARCH-LOAD AND WEIGHT ALLOCATION.

ITEM	WEIGHT IN POUNDS * GUNNER	TEAM CHIEF
Clothing	8.12	8.12
Personal Equipment & Existence Load		
Frame, pack, including lower back, shoulder, & waist straps	3.10	3.10
Pack, medium, combat, field	2.46	2.46
Canteen (filled) w/cup and cover	3.60	3.60
Intrenching tool w/carrier	2.52	2.52
Individual equipment belt, first aid packet w/case & suspenders	1.59	1.59
2/3 ration	3.50	3.50
Poncho liner	1.60	1.60
Toilet articles	1.00	1.00
Personnel Armor		
Helmet w/liner	3.44	3.44
Armor vest	9.30	9.30
Individual Weapon & Ammunition		
M16 rifle w/sling & 1 magazine (30 rds)		7.91
Pistol w/holster, & 3 magazines (21 rds)	4.59	
NBC Protection		
M17A1 mask w/carrier	2.97	2.97
Suit, chemical, protective w/gloves & hood	3.78	3.78
Stinger System Equipment		
Weapon-round w/BCU	34.70	34.70
BCU spare	1.70	1.70
IFF belt pack w/cable	5.80	
Other TOE Equipment		
AN/PRC-77 radio w/battery		23.50
Binoculars w/case		2.86
Compass, magnetic w/case		.43
Sunglasses w/case	.30	.30
TOTAL WEIGHT	**94.07 lbs**	**118.38 lbs**

*Typical weights extracted from FM 21-15.

Learning Event 9: SYSTEM SUPPORT CAPABILITES

Stinger crews must know where to obtain needed repair and service for their weapon systems and training equipment. They must know what maintenance is authorized at their level on this equipment. Additionally, Stinger crews must know whom to contact for needed rations and supplies when attached to maneuver elements. This objective discusses these points and outlines the maintenance and logistics support concept for Stinger crews.

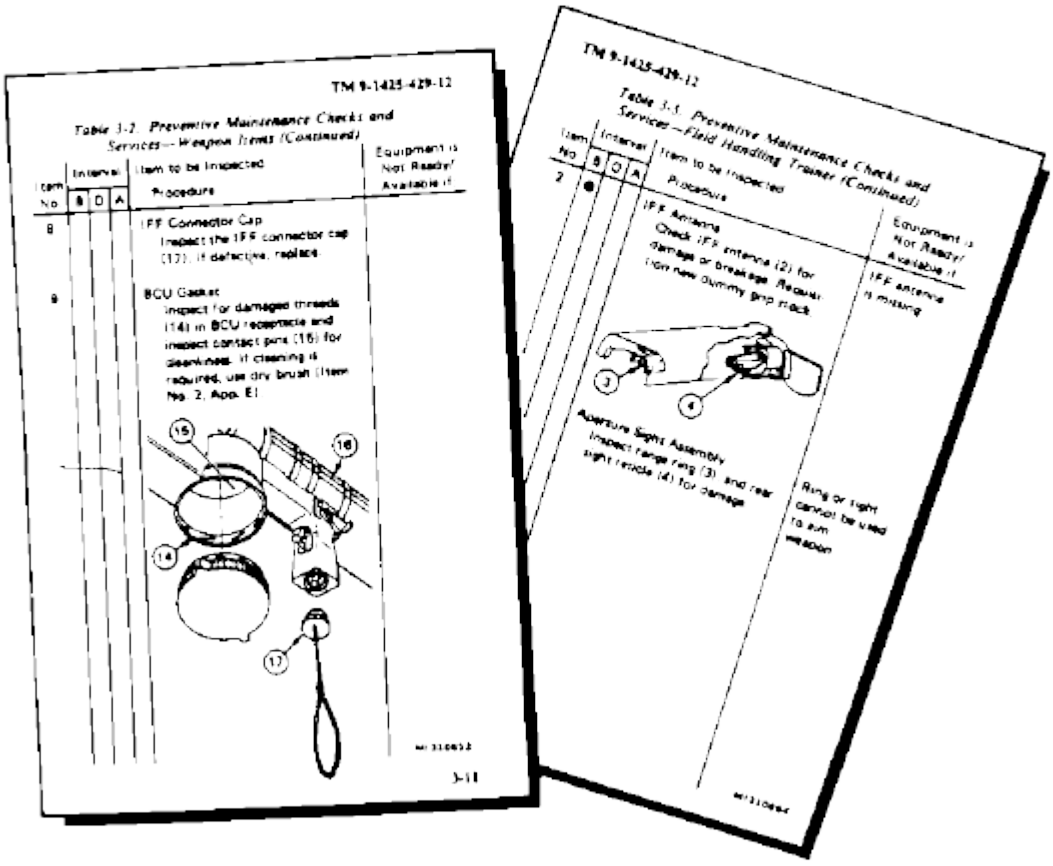
ORGANIZATIONAL MAINTENANCE

The Stinger weapon is issued as a certified round of ammunition. Stinger weapon maintenance is done only at organizational and depot levels. There are no intermediate levels of maintenance. Organizational (user) maintenance is done by the Stinger crew. Weapons that cannot be repaired at organizational level will be exchanged for operational weapons at the ASP. User maintenance consists of preventive maintenance (PM) and replacement of certain parts. Maintenance tools and equipment are limited to cleaning and painting materials and the TL-29. The TL-29 is a combination flat blade screwdriver and knife. No special tools, test equipment, or training are required to perform this maintenance (Figure 107). Examples of PM performed by crew members are-

- Stinger Weapon. Correct visually detected faults on the exterior. Replace selected external components, such as sling assembly, protective end caps, and eyeshield.
- IFF Interrogator. Correct visually detected faults on the exterior. Clean periodically and spot paint.
- Shipping and Storage Containers (Metal). Check humidity indicators; inspect exterior for leaks, deterioration, damage, and loose or missing parts; repaint missing or illegible markings; and tighten or replace loose or missing parts.
- Shipping and Storage Container (Wooden). Inspect exterior for damage or leaks; replace broken or missing binding wires.
- Transport Harness. Oil fasteners occasionally (light oil); clean periodically.

Note: PM on the IFF programmer and Stinger trainers is performed at the section level.

FIGURE 107. SPECIFIC MAINTENANCE CHECKS AND SERVICES ON STINGER EQUIPMENT ARE LISTED IN TM 9-1425-429-12 AND TM 9-6920-429-12. CAREFUL ATTENTION SHOULD BE GIVEN TO THE SAFETY PRECAUTIONS LISTED IN THESE TECHNICAL MANUALS.



STINGER SYSTEM TACTICAL EQUIPMENT

Weapon and Missile-Round

Operator/user maintenance of Stinger weapon- and missile- rounds is performed by the individual crews. This maintenance consists of correcting visually detected faults on the exterior of the equipment. Repair parts required to perform the maintenance are kept in the authorized storage list (ASL) of the direct support unit (DSU) to which the Stinger section is assigned.

In peacetime, missile-rounds found unserviceable by surveillance checks are returned to the depot for repair or disposal.

In combat, missile-rounds which do not work will be destroyed. Should a weapon-round malfunction during engagement, the round and gripstock are considered unserviceable. After following appropriate safety procedures, the gripstock is removed and returned to the missile DSU. Procedures for handling hangfires, misfires, and duds can be found in Chapter 3, FM 44-18-1.

A BCU which does not activate is discarded by the user. Activated BCUs are also discarded by the user.

IFF Interrogator and Programmer

The IFF interrogator has its batteries recharged and is reprogrammed by the section headquarters. The reprogramming for mode 4 is done using the IFF programmer. With precharged batteries, the interrogator can be programmed and checked out within 10 minutes. User maintenance consists of visual inspection of the exteriors for damage, periodic cleaning, and spot painting. Unserviceable items are turned into the DSU for replacement. The section maintains operational float interrogators for exchange with the crews.

Transport Harness

There is no maintenance on this item other than normal routine preventive user maintenance. If the straps are torn on the transport harness, it may be taken to the DSU and sewn. If a buckle is bad, it will be turned in as unserviceable. A new buckle will be issued.

Shipping and Storage Containers

Containers which cannot be repaired at the user level are turned into the DSU for replacement. A damaged container is exchanged for a new container. Do not use the weapon if the container has been dropped from a distance of 2 feet or more.

LESSON 2 PRACTICAL EXERCISE

Instructions The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

---

1. The main features of an aircraft that affect detection range are--

- ○a.visual acuity, meteorological visibility.
- ○b.speed, color, visual acuity, meteorological visibility.
- ○c.c. size, color, speed, altitude, meteorological visibility, and visual acuity.
- ○d.size, speed, altitude, and visibility.

2. When operating as a split crew, or if the crew chief becomes a casualty, target identification becomes the responsibility of the--

- ○a.section chief.
- ○b.gunner.
- ○c.assistant gunner.
- ○d.platoon sergeant.

3. Single target raids are engaged using a--

- ○a.SHOOT-SHOOT-LOOK-SHOOT technique.
- ○b.SHOOT-LOOK-SHOOT technique.
- ○c.SHOOT-NEW TARGET-SHOOT technique.
- ○d.SHOOT-NEW TARGET-LOOK-SHOOT technique.

4. Multiple-aircraft raids are engaged using--

- ○a.SHOOT-NEW TARGET-SHOOT technique.
- ○b.HOSTILE, SHOOT-NEW TARGET-SHOOT.
- ○c.SHOOT-NEW TARGET-SHOOT, ENGAGE.
- ○d.HOSTILE, NEW TARGET-SHOOT.

5. For Stinger engagement purposes, aircraft have been placed in--

- ○a.three categories: jet, propeller, and all helicopters.
- ○b.two categories: jet, propeller, and all helicopters.
- ○c.two categories: jets and props.
- ○d.two categories: hostile and friendly.

6. When the aircraft fills the range ring gap, it is at--

- ○a.1/5 the range ring.
- ○b.1/50 the range ring.
- ○c.1/4 the range ring.
- ○d.1/3 the range ring.

7. For propeller aircraft, no time count rule or range ring measurements are used. The gunner can launch as soon as which of the following has been accomplished?

- ○a.CAGE/UNCAGE switch released, tentative identification, and IR lock-on
- ○b.weapon activation, tentative identification, and IR lock-on
- ○c.weapon activation, positive hostile identification, and IR acquisition lock-on
- ○d.CAGE/UNCAGE switch depressed, tentative identification, and IR lock-on.

8. After an engagement in forward areas, the Stinger crew must quickly move to--

- ○a.an alternate position
- ○b.a supplementary position
- ○c.another primary position
- ○d.section headquarters

9. The position occupation checklist should include--

- ○a.working on alternate positions as time allows
- ○b.checking local security
- ○c.inventory of personal equipment
- ○d.both a and b

10. Stinger crews with an airborne division are equipped with two--

- ○a.AN/VRC-47 radios
- ○b.AN/PRC-68 radios
- ○c.AN/GRC-160 radio sets
- ○d.AN/PRC-77 and AN/PRC-68 radios

11. Stinger crews with an airmobile division are equipped with the--

- ○a.AN/PRC-77 and AN/PRC-68 radios
- ○b.AN/GRC-160 radio sets
- ○c.AN/VRC-47 radio set
- ○d.AN/PRC-68 radios

12. When connected with field wire, the AN/GRA-39B can be operated from a distance of up to 3.2 km (2 mi).

○T
○F

13. Each Stinger crew is issued two TA-1/PT telephone sets.

○T
○F

14. The FAAR system is a complete, self-contained, highly mobile radar system. It also provides identification in terms of FRIEND or FOE.

○T
○F

15. The TADDS is a lightweight receiver which receives and displays target alert information sent from the FAAR. It displays location and positive identification of aerial targets which are detected by the FAAR.

○T
○F

16. An orange disk on the TADDS appears for an unknown.

○T
○F

17. When air attack is imminent, the Stinger crew moves its vehicles off the road, dismounts, and takes up the best available firing position, regardless of the option chosen by the convoy commander.

○T
○F

18. The two methods available to positioning a Stinger crew supporting a maneuver unit are to deploy the crew behind the maneuver unit or deploy the team with the formation.

○T
○F

19. Stinger crews assigned to the airmobile division are equipped with a vehicle.

○T
○F

20. When Stinger crews are to support a mechanized element, the maneuver commander may provide the crews with tracked transportation.

○T
○F

21. The Stinger crew sometimes dismounts to support maneuver elements in difficult terrain. Under this condition, the crew is limited to carrying only two Stinger weapons.

○T
○F

22. The Stinger weapon is issued as a certified round of ammunition and maintenance is done only at organizational and depot levels.

○T
○F

23. In peacetime, missile-rounds found unserviceable by surveillance checks are returned to the depot for repair or disposal.

○T
○F

LESSON 3: STINGER TRAINING AND TRAINING DEVICES

TASK

Describe Stinger training concepts and moving target simulator (MTS) training.

CONDITIONS

Given information on the concepts of Stinger training and MTS training.

STANDARDS

Demonstrate competency of the task skill and knowledge by responding to the multiple-choice test covering concepts on Stinger training and MTS training.

Learning Event 1: STINGER CREW OPERATIONS

GENERAL

To be effective, training must prepare Stinger crews to do their jobs in combat. To have proficient Stinger crews, adequate time must be made available to conduct realistic training in tactical field exercises. Enough time must also be made available to conduct refresher training in weapon handling and practice engagements. A training program for Stinger personnel must be well planned. It must also remain flexible. Mission needs may dictate that a short intensified program be conducted. However, the goal is still to develop and maintain Stinger gunner and crew skills at a high level. This lesson discusses some factors to consider in training to reach that goal. Planning and preparing military training are covered in FM 21-6. The Stinger platoon's parent unit commander has the authority and responsibility for planning, directing, conducting, and supervising training. He trains his crews to the highest degree of operational readiness allowed by the available ability of-

- Personnel.
- Equipment.
- Time.
- Funds.
- Facilities.
- Operational requirements.
- Installation support requirements.

He accomplishes this by using his officers and noncommissioned officers (NCO) to schedule and conduct planned training.

TRAINING ASSESSMENT

The commander assesses the proficiency of the unit and individual based on-

- Personnel observation.

- Sampling techniques.
- Performance tests.
- Field exercises.
- Soldier's skill qualification tests (SQT).
- Army training and evaluation programs (ARTEP).

This assessment is essential to the success of the training program for Stinger crews and is used to identify training needed. The following procedures will assist the commander in making the assessments.

Current Proficiency

To determine each individual's proficiency, analyze the experience level in his assigned position, including results of previous training.

Evaluate the overall training level of the section. Conduct maintenance inspections, equipment operating tests, operational readiness training tests (ORTT), field exercises, and team quick-reaction drills.

Review the results of the last SQT and ARTEP to see if any deficiencies surface because of poor team performance.

Training Standards

To determine what training will be necessary to meet required training standards, compare the results of the gunner's current proficiency with the required training standards contained in the soldier's manual. This comparison will show the levels of training required to bring the gunner's proficiency up to the proper standards.

Time Available

To determine how much time is available to achieve the required standards, examine the section's overall mission requirements and other obligations; then evaluate how much training is needed.

Resources Required

To determine what resources are required to train each crew member, refer to FM 44-18-1, Chapter 13, "Stinger Training Devices and Materials," for innovative solutions to overcome possible shortfalls. Also refer to the latest ARTEP and any unacceptable scores received on the latest SQT. These are indicators of training resources required for further training. Review previous training experiences of the section which indicate previous resources used.

Resources Available

To determine what resources are available to conduct gunner training, inventory section equipment and evaluate its readiness; determine what assistance is available from supporting units and higher headquarters; and examine available training facilities.

Reconcile All Considerations

Differences between resources required and resources available will affect the time required to conduct the training and the section's ability to meet the required standards.

PERFORMANCE-ORIENTED TRAINING

Training of both individuals and teams must be performance oriented. To accomplish this, the commander/trainer must ask three questions when making a training program-

- Mission/Task. What is the soldier/crew expected to do in combat?
- Conditions. Under what conditions is the mission/task to be performed?
- Standards of Performance. How well is it to be done?

EXAMPLE

TASK: Select and occupy a position.

CONDITIONS: Crew is given location, primary sector of search, and 1:50,000 map of the area.

STANDARDS: Crew chief conducts ground reconnaissance while the gunner maintains a ready status.

Crew chief selects primary and alternate positions on the ground.

Crew occupies position within 30 minutes.

Selected positions-

- Are within given approximate location.
- Have clear fields of fire.
- Have all-around observation if possible.
- Have access and egress routes.
- Have a 50-meter backblast area.
- Take advantage of available cover and concealment.

The tasks, conditions, and training standards of proficiency are specified in appropriate training documents as follows:

- Soldier's Manual. The soldier's manual identifies, defines, and describes individual tasks and standards of performance necessary for success on the battlefield. These tasks and standards, along with the training guidance, provide the basis for training and evaluation of the individual soldier.
- Trainer's Guide. The trainer's guide lists for the training manager the tasks the soldier must master to be proficient in his job and survive in combat. It also lists the source and location of training and supplemental training materials.

- Job Book. The job book enables the NCO to monitor and keep a record of critical and common task proficiency for each of his soldiers. The job books are issued to each NCO supervisor for each soldier under his supervision in skill levels 1 and 2.
- Skill Qualification Test (SQT). The SQT is a three-part performance test designed to measure a soldier's ability to do his job. Stinger crews must also take SQTs to qualify them for promotion. The SQT consists of three components: skill, hands-on, and job site (commander's certification). The skill (or written) component is like any written military test. It consists of a number of questions with multiple-choice answers. The hands-on component requires a scorer to watch the soldier perform a required task in a simulated job situation. In the job site component, commander and supervisor are required to certify whether or not the soldier has satisfactorily performed a given task.
- Army Training and Evaluation Program (ARTEP). An ARTEP provides guidance for collective training and evaluation. ARTEP identifies the mission, tasks, and conditions under which the tasks are to be performed, and the proficiency of each unit.

STINGER TRAINING PROGRAM

The goal of the annual Stinger training program is to maintain Stinger crew, section, and platoon skills throughout the training year. The program achieves its goals through continuous reinforcement training. It is composed of-

- Quick-reaction drills conducted periodically.
- Moving target simulator training conducted periodically.
- Simulator device firing conducted periodically.
- Annual live firing.

This program is designed to prevent your skills from deteriorating with time. It provides a mix of crew drill training, simulated firing, and live firing. Each type of training reinforces the other, and is an essential part of the overall training. The training program is based on two principles. Train from simple to complex. Begin with simple drill exercises, using simulation devices, and work up to complex ARTEP evaluations. Precede live firings with simulation devices. Train engagement skills repetitively. The skills taught in each step are repeatedly used in succeeding steps.

Stinger Training Guidance

Schedule training well in advance and organize it to take advantage of existing time and resources. Training should be scheduled for a whole year. Detailed monthly training schedules should be prepared. This tells both leaders and soldiers how time is used, where training takes place, and the subject being taught. Also it tells who is responsible for the training, what equipment is needed, what references are available, and what, if any, coordinating instructions are necessary. Prepare these schedules as far in advance as possible to ensure all crews and individuals are prepared for training.

Train Under Realistic Conditions. Combat is hard to simulate, but you cannot train good Stinger crews without simulating the pressures, noises, or other problems experienced in combat.

Conduct Training With Supported Units. Whenever possible, arrange to conduct tactical training with the units you will support in combat. Stinger crews must habitually work with the units they support.

Concentrate Training in Areas Where it is Most Needed. Do not waste time by training in the skills your crews and soldiers have already mastered. Know where the weak spots are and train to correct them.

Cross-Train All Crew Members. When each crew member becomes proficient in his own job, train him to do the other crew member's job. For example, train the gunner to operate the crew's radio.

Individual and Crew Training

The soldier's manual is a key element in individual training. It serves as a basis for the SQT. By studying his manual, a Stinger crew member can determine what makes up his SQT and how to prepare for it. The Stinger Soldier's Manual, FM 44-16S, identifies those tasks needed to refine an individual's basic skills.

Mastering individual skills is the beginning of an effective Stinger crew. Proficiency in these tasks ensures that Stinger crews will be able to meet the threat's challenge. The tasks are broken into two groups. The first group is common tasks. These tasks must be mastered by all Stinger personnel. The second group lists those tasks required by duty position or proficiency level. When individual standards are met, the Stinger crew and section must function together where Stinger gunnery and tactics are combined. Only after all Stinger personnel have been trained to perform these tasks at the required standards will the crew be able to effectively accomplish its mission on the battlefield.

The training required for specific Stinger tasks can be found in the appropriate lesson or learning event of this manual.

Tactical Training

Quick-Reaction Drills. Quick-reaction drills develop team work. They are used to develop quick-reaction where time is important. An example is a situation where a crew must defend against aircraft making an attack against a convoy. Crews should practice the drills with the same precision as a well-executed football play. The drills are easy to prepare, can be conducted almost anywhere, and will take only a few minutes.

Terrain Walk. The terrain walk is a proven method of training. When used, it should be completed with leaders first and then with troops. It involves nothing more than a leader (any leader) taking his men on a tour (by foot or vehicle) over a predetermined route and discussing applications of various tactical principles and techniques along the route.

The objective is to give the crew members an appreciation for various tactics or techniques in the employment of Stinger. An informal, two-way question and answer procedure is the most productive.

Few methods of training will implant tactical concepts better than a well-conducted terrain walk. For example, this terrain walk can be used to point out how a Stinger crew can support a company team on a forward movement (Figure 108).

FIGURE 108. TERRAIN WALK.

The principle purpose for conducting a terrain model exercise is to reinforce the training each Stinger crew member received in the classroom-prior to undergoing a practical exercise in the field. The terrain model exercise is really a small tactical exercise in which each man can see how he fits into the whole picture.

The terrain model exercise permits the leader to-

- Discuss the roles of the supported unit, adjacent units, and other units connected with the field exercise.
- State the mission of the section and teams.
- Discuss the SOPs for actions on contact, security, occupying positions, et cetera.
- Ask questions of each crew member.
- Point out terrain features which attack helicopters can slip behind and then attack friendly armored vehicles.
- Answer questions and clear up any misconceptions.
- Use subscale model vehicles.

Field Training Exercise. Another way to train the crews and section is the field training exercise. This exercise should be conducted under complete tactical conditions so that all aspects of training are exercised. The field training exercise obviously requires more training and preparation than the previous methods. It requires a scenario, an operation order, and control personnel. The best way to

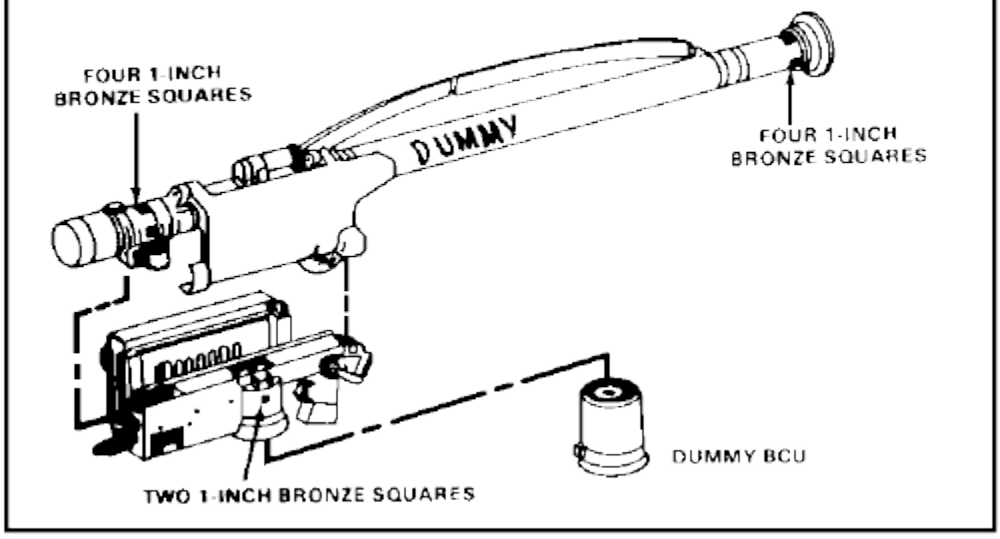
start the exercise is with an alert and movement to an assembly area. From this point it can take any form you desire, depending on your training needs.

Field Handling Training (FHT) M60

The Stinger gunner uses the field handling trainer (FHT) to practice basic manual skills of weapon handling, operation, sighting, and ranging. The FHT can be used to visually track actual aircraft or radio-controlled targets. It also allows the gunner to practice mating/removal of the grip-stock and insertion/removal of the BCU.

The FHT has the same size, weight, and external appearance as the Stinger weapon-round. Controls and mechanical operation are the same as the weapon-round; however, indications of target acquisition are not provided. Each Stinger crew is issued one FHT (Figure 109).

FIGURE 109. FIELD HANDLING TRAINER (FHT) M60.

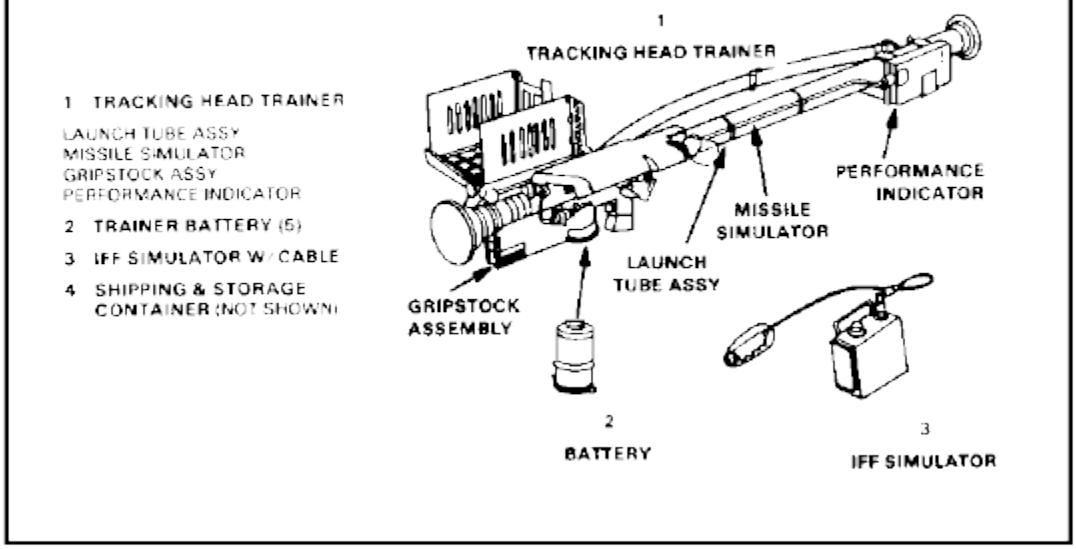


Note: The FHT can be easily identified by the four 1-inch bronze squares on the front and rear sections of the trainer.

Training Set guided Missile M134

The M134 training set consists of the tracking head trainer (THT), five rechargeable NI-CAD batteries, an IFF simulator with cable, and a shipping and storage container. This training set is used by the gunner to develop and maintain proficiency in tracking aircraft and firing the Stinger weapon (Figure 110).

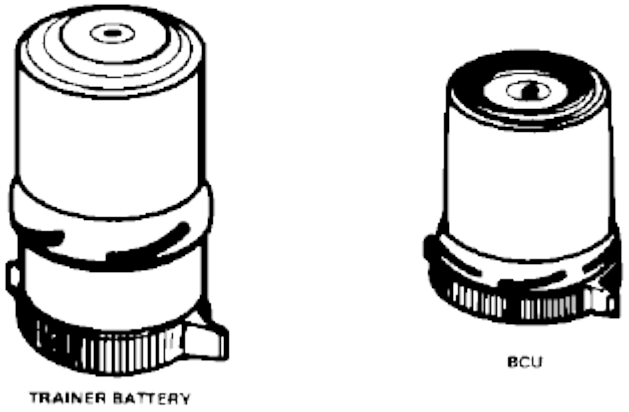
FIGURE 110. M134 TRAINING SET.



Tracking Head Trainer. The trainer consists of the launch tube assembly (which contains the missile simulator), gripstock assembly, and a performance indicator. The trainer has the same general appearance as the weapon-round except for the performance indicator assembly. This assembly is strapped near the aft end of the launch tube. The trainer weighs about 38 pounds (Figure 110).

Trainer Battery. The external appearance of the trainer battery is similar to the BCU except that the trainer battery is approximately 3 inches longer and about twice as heavy. At least 15 training missions of 47 seconds each are possible with a fully charged battery (Figures 110 and 111).

FIGURE 111. TRAINER BATTERY.



The IFF simulator provides random, simulated IFF interrogation responses to the audio device in the trainer as on the weapon (Figure 110).

Further description of the training set and ancillary equipment is found in TM 9-6920-429-12. Use of the THT for gunner evaluation is found, where appropriate, in Chapters 15 and 16 of FM 44-18-1.

Electrical components provide the same audiovisual indications as the weapon when acquiring and tracking a target. Electrical power is provided by a rechargeable NI-CAD battery. Batteries are recharged on a battery charger (Figure 110).

The missile simulator has two major parts: the seeker section and the coolant reservoir assembly (gas bottle). The seeker works the same as the seeker on the weapon. The gas bottle contains pressurized argon gas which cools the seeker during each training mission. Under normal conditions, eighty 47-second practice engagements can be completed when the gas bottle has been fully pressurized (Figure 110).

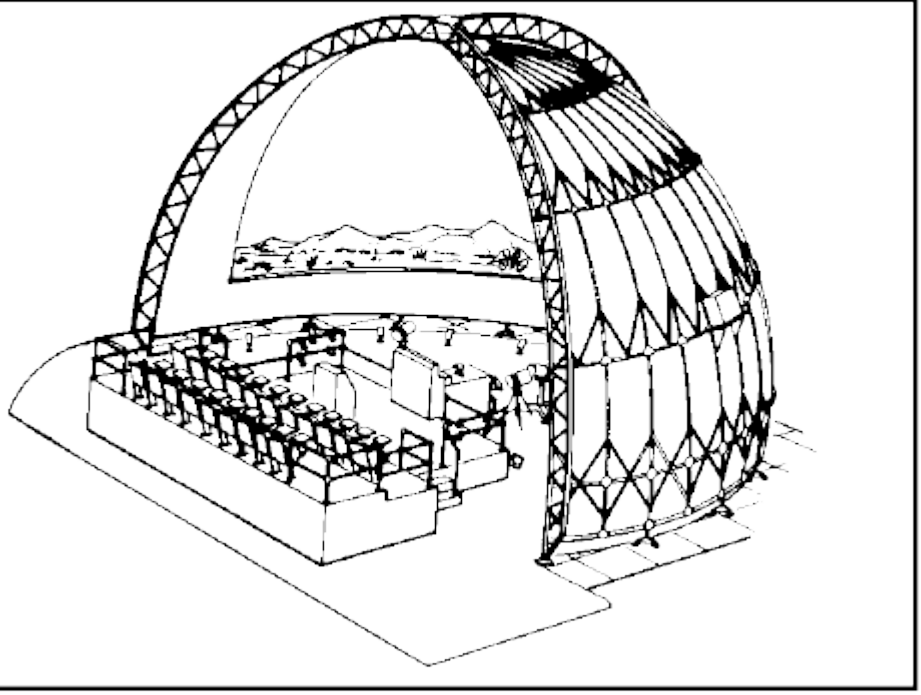
The performance indicator displays the gunner's progress in a simulated engagement. It provides indications that the gunner has-

- Correctly performed the engagement sequence.
- Committed a correctable error-a procedural error that can be corrected prior to squeezing the firing trigger out of sequence.
- Allowed the 47-second timer to run down which shuts down the trainer (Figure 110).

Moving Target Simulator (MTS M87A1)

The MTS M87A1 provides representative sights and sounds of aircraft expected to be encountered by Stinger gunners. Environmental realism is achieved through the use of a large display area, aircraft presentation, and sound. Aircraft images are projected on a curved display screen. The stereophonic sound is provided by recorded sound strips on the aircraft motion picture film. Another projector superimposes an IR spot on the aircraft image to complete the simulation of the tactical environment (Figure 112).

FIGURE 112. MOVING TARGET SIMULATOR (MTS) M87A1.



There are two training stations. Each one is capable of accommodating an instructor and a gunner with a Stinger THT. To the rear of the training station is an observation area from which other gunners can observe the engagement sequence (Figure 112).

The MTSs are located at major installations in the Continental United States (CONUS) and overseas. A complete description of the MTS is found in TM 9-6920-427-10.

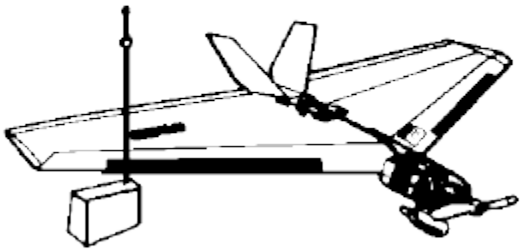
Launch Simulators

Stinger simulator devices under development are the Stinger launch simulator (STLS) and the THT/launch simulator (LS). The STLS launches a dummy projectile and simulates an actual missile launch. This device allows every gunner an opportunity to fire a weapon (launch a dummy missile). The THT/LS produces a simulated backblast effect when fired. Because of this, Stinger gunners using the THT/LS are more visible during field training exercises. This not only allows them to be more effectively evaluated but also allows them to enjoy a greater sense of participation in the exercise.

Guided Missile Target, Miniature FQM-117A

The FQM-117A is a durable target capable of providing an accurate simulation of an attacking aircraft. An IR source device can be attached to the target. This device provides the gunner practice in tracking and ranging. FQM-117As are available through the local Training and Audiovisual Support Center (TASC) (Figure 113).

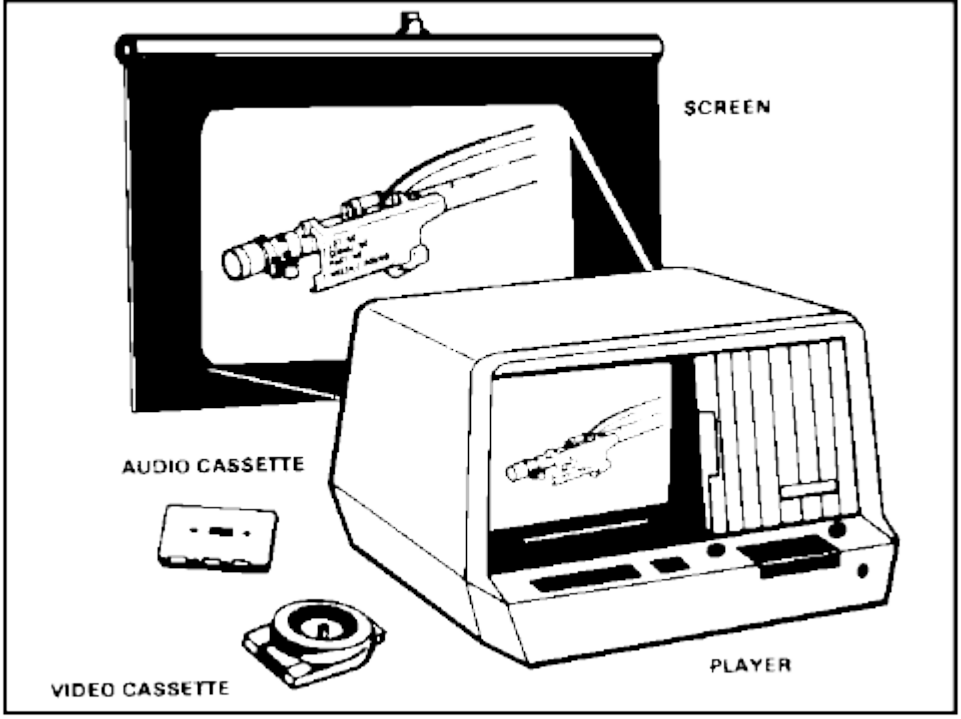
FIGURE 113. FQM-117A.



Beseler Cue/See

The Beseler Cue/See is used with the training extension course (TEC) lessons. It can be used for training in all aspects of Stinger gunner procedures. The lessons are presented via a super 8-mm continuous loop cartridge projected on a 6- by 8-inch screen. The Beseler's light weight and small size allow it to be used almost anywhere. Eight Beseler Cue/Sees are issued to a combat arms battalion/squadron (Figure 114).

FIGURE 114. BESELER CUE/SEE.



This device is best used with one or two soldiers at a time. However, the lesson may be shown to a large group, if necessary. After completing each TRC lesson, the soldier completes a written test. If he answers all training objectives correctly, he goes on to the next lesson.

The local TASC has a catalog of all TEC lessons produced by Army service schools.

Training Films

US Army training films can be used to support the instruction of Stinger personnel in both Army-wide skills and in Stinger operations (Figure 115). DA Pamphlet 108-1 is an index of Army motion pictures and related audiovisual aids. It lists available training films and other audiovisual materials. Films of particular interest to trainers are-

- The 44-series relating to Stinger, aircraft recognition, and other related subjects.
- The 21-series relating to the individual soldier.
- The 5-series relating to camouflage and field fortifications.

Films and projection equipment are obtained from TASC. Specific Stinger training films/television tapes that are in production include-

Films

Introduction to the Stinger Guided Missile System (U), TF 44-6076 (color-20 minutes).

Stinger Weapon System-IFF Programming (U), to be produced (color-15 minutes).

Stinger Gunner-Target Engagement Procedures (U), to be produced (color-20 minutes).

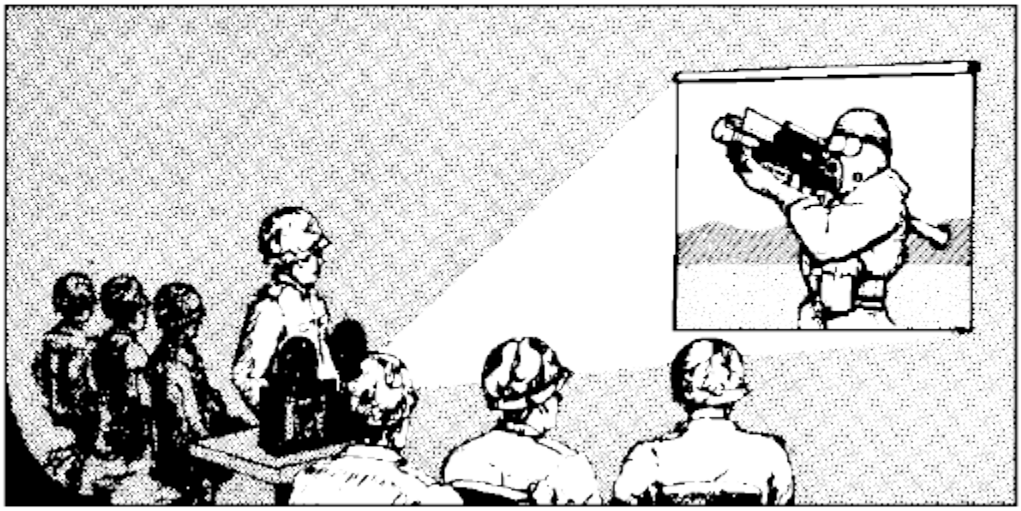
Television Tapes

Stinger-Assembly, Checks, and Transportation, TVT 44-138 (color-20 minutes).

Stinger Employment, TVT 44-140 (color-20 minutes).

Stinger Team-Quick Reaction Drills, TVT 44-139 (color-20 minutes).

FIGURE 115. TRAINING FILMS TO SUPPORT INSTRUCTIONS.



Publications

The DA Pamphlet 310-series supports the training of Stinger personnel. Of particular importance are DA Pamphlets 310-1 and 310-12. Each of these pamphlets is cross-indexed by subject and is updated by the distribution of changes as required.

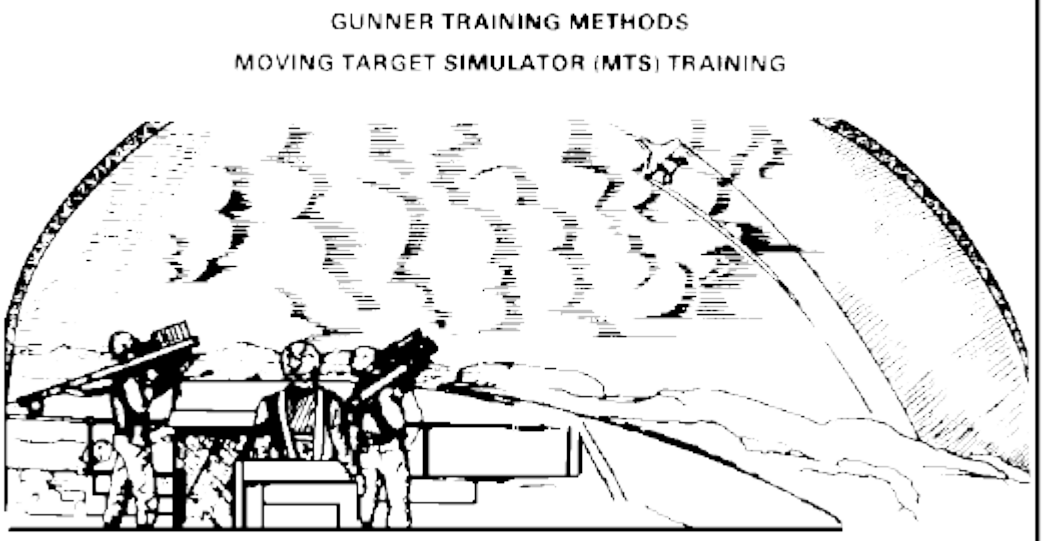
Learning Event 2: STINGER TRAINING CONCEPTS

To achieve a high state of proficiency, Stinger gunners must receive proper gunner training. If proficiency is to be maintained at an acceptable level, training must be standardized, increased, and scheduled at regular intervals.

MOVING TARGET SIMULATOR (MTS) TRAINING

The MTS is the most effective single training device for training Stinger gunners. The MTS training must be supplemented by live-tracking exercises. This is because of background IR discrimination training requirements. The units, which have MTS facilities nearby and use them, show a higher proficiency level which is proportional to the amount of time spent tracking targets. It is critical that where MTS facilities are available gunners receive regular scheduled training in Stinger weapon handling and tracking. (Figure 116).

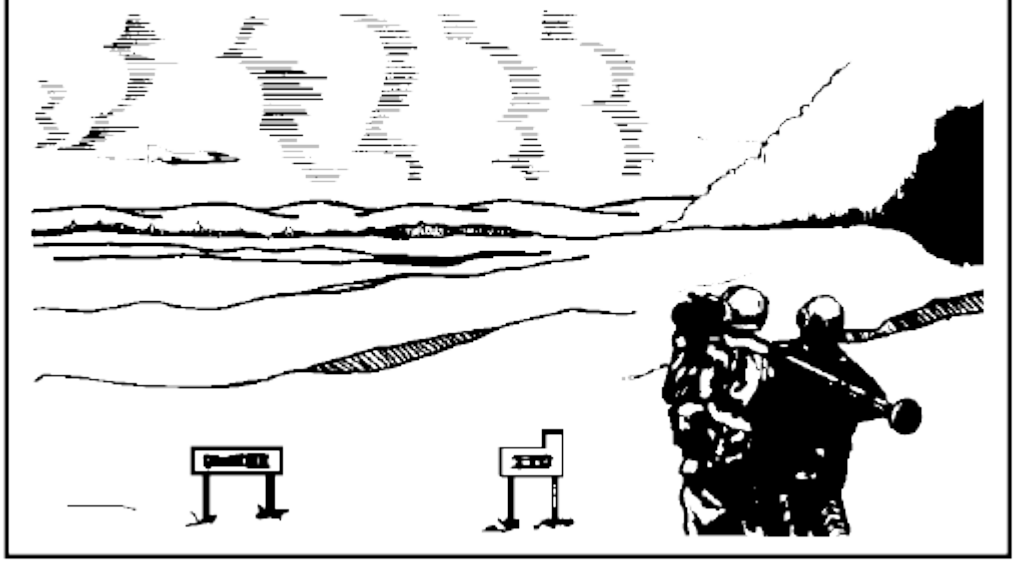
FIGURE 116. MOVING TARGET SIMULATOR TRAINING.



TRACKING LIVE TARGETS

Some units having Stinger sections do not have access to an MTS. In this case, Stinger trainer personnel must use other methods of training their gunners to engage targets. Use of video-controlled miniature aerial targets (RCMAT) can meet the requirement for Stinger gunners to simulate engagement of targets. The RCMAT is suitable for use with the THT to train gunners to track live targets (Figure 117).

FIGURE 117. TRACKING LIVE TARGETS.



If the section is located near a military air base or civilian airport, gunners can receive meaningful training in tracking live aircraft. Money restraints restrict opportunities for Stinger sections to have tactical military aircraft for training purposes. The Stinger training manager or trainer can overcome this problem by using some innovations. For example, the trainer may ask the other services to have Stinger gunners practice engagement of their tactical aircraft. This could entail busing Stinger personnel to an Army airfield or Air Force base.

Section and crew chiefs can offer their gunners valuable, meaningful training by setting up a tracking range. Examples of suitable areas are-

- Abandoned airstrips.
- Open fields.
- Parade fields.
- Maneuver areas.

Tracking and simulated engagements of live aircraft with the THT give Stinger gunners more realism. The realistic aspects of engaging real aircraft during bombing and strafing runs are not found in the other training methods. This is where the gunner receives background IR discrimination training.

TRAINING ON A TRACKING RANGE WITH RCMAT

To maintain proficiency, Stinger gunners must track and practice engagement of aerial targets frequently. However, because of the high cost of using real aircraft, it is difficult to obtain sufficient tracking practice. To overcome this training limitation, more gunner training must be done at the home station, using innovative training techniques and devices to simulate real aircraft. This training requirement has been met with the development and use of RCMAT as flying targets in unit training areas.

The RCMAT is a durable target capable of providing simulation of an attacking aircraft. It provides a target for detection, acquisition, tracking, and simulated firing with the Stinger weapon.

RCMAT, FQM-117A

As a practical matter, the target's usage is limited by the imagination of the unit commanders, the target operator's skill, and the restraints of range safety. The target can be flown in any weather. The visual reference required for flying is normally the limiting factor. Surface winds 25 knots or below do not restrict the system's usage.

A second characteristic is the "combative" nature of the miniature missile target. The maneuver capabilities of the target match those of any full-size, fixed-wing aircraft and the use of these maneuvers is under the direction of the instructor. Thus, the target can challenge the gunner by flying in a realistic manner, taking full advantage of terrain features, evasive maneuvers, and scale speed.

This unrestricted presentation capability introduces a competition between target and gunner that holds the attention of the personnel in the training area. Improved morale based on this competition is a most important element in the FQM-117A's success to date.

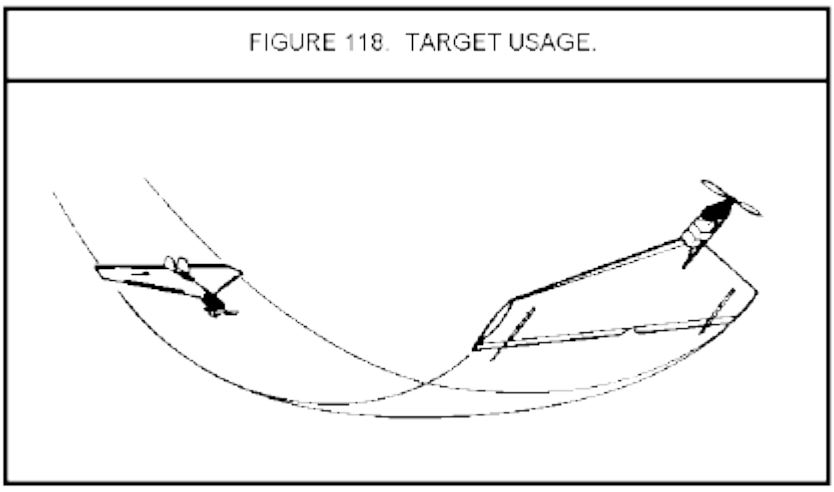
Another characteristic of the system is the low level of logistic support required.

FQM-117A's are available through training and TASC. They are normally issued in kit form.

- Kit, Airframe, FQM-117A, contains an engine, 3 airframes, 10 propellers, 4 glowplugs, and assembly materials.
- Kit, Transmitter, contains three transmitters on 25.450 MHz, and three transmitters on 25.534 MHz.
- Kit, Ground Support Equipment, consists of station case, operator's manual, parts box, three flight boxes, two tool sets, and electrical test equipment.

Assembly and operation of the FQM-117A is the responsibility of the using unit, normally the battalion. One trained operator and a helper are required (Figure 118).

FIGURE 118. TARGET USAGE.



Operating Ranges Versus Simulated Target Range (Equal Tracking Rate at Representative Speeds)

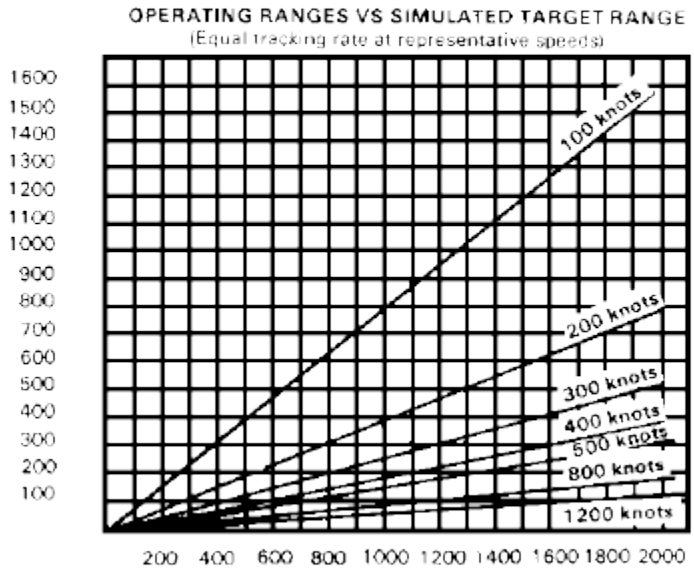
This graph gives an idea of representative distances from the Stinger position to the target (real aircraft versus miniature target) (Figure 119).

Step 1. Locate desired simulated target range along bottom line of chart.

Step 2. Move up chart along this line until desired target speed intersects with this line.

Then left to find operating range for the FQM-117A.

FIGURE 119. GRAPH OF REPRESENTATIVE DISTANCES

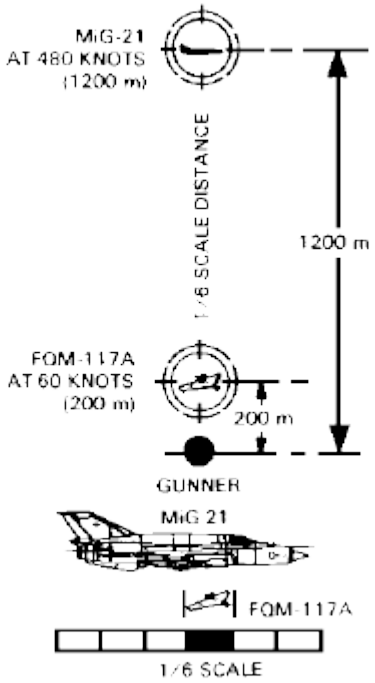


Size Relationship

THE FQM-117A has approximately one-sixth of the speed and visual size of a full-size threat aircraft. When it is flown at scale distances, it simulates the performance envelope of the target aircraft to give the trainer a realistic adversary for his tracking training.

Using a tracking range or tracking area, units can realistically simulate Stinger engagement of real aircraft. When using the target, remember to adjust the distance for the scaled down version of a real aircraft. To give relative figures, the diagrams show the relationship between the model and an actual aircraft when tracking a crossing target. The speed and the distance from the gunner are approximate figures (Figures 119 and 120).

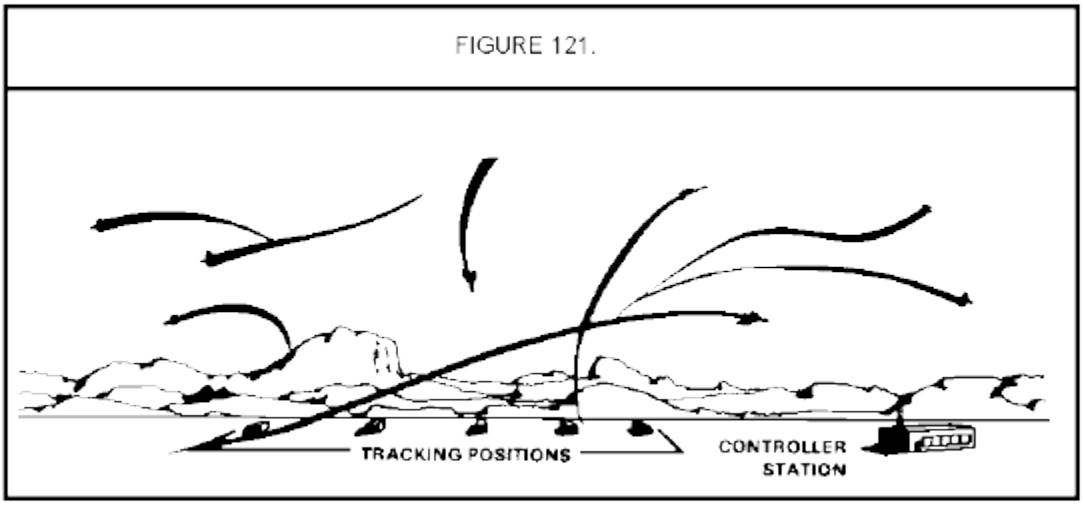
FIGURE 120. SIZE RELATIONSHIP.



Using The Miniature Target

The instructor coordinates closely with the target controller prior to an exercise. For example, he may want the target to execute pop-up attacks to exercise the gunner's skill in coping with this type of maneuver. Target maneuvers can range from easy to track to impossible to track. The instructor should have some flights pass over or close to the Stinger position. This provides the gunner with realistic situations when engaging high-speed aircraft at close range. A sample nonfiring tracking area layout is shown below with a number of selected flight paths (Figure 121).

FIGURE 121.



PROTECTIVE MASK TRAINING

Stinger crew members must be allowed to don a protective mask, such as the M17A1, while training in the MTS and when tracking live aircraft and targets. Training with the protective mask accustoms the crew members to handling the weapon in an NBC environment. Some difficulty may be experienced in feeling the vibrations generated by the IR acquisition indicators with the mask on. However, the IR tone can be heard. The crew member may have to adjust his head position slightly to obtain a clearer sight picture. Tracking with the mask on will reinforce the crew member's confidence in firing the weapon in an NBC environment (Figure 122).

FIGURE 122. PROTECTIVE MASK TRAINING.

TRAINING EXTENSION COURSE (TEC) LESSONS

Definition of TEC

The TEC system is designed to assist soldiers and unit commanders in increasing job proficiency. It consists of audiovisual, audio only, and printed text lessons. Audio- visual projectors and cassette tape players are included to present the lessons. The lessons provide performance oriented training in many subjects needed by Stinger gunners. These subjects include skills that are common to all soldiers as well as those skills needed to operate and maintain Stinger weapon systems. This makes TEC an essential part of unit training programs. Use of TEC lessons provides flexibility in the unit training programs. It allows commanders to stress skill required by individual soldiers. TEC lessons can be presented-

- In unit learning centers, classrooms, or in the field.
- To individuals or small groups.
- As self-paced instruction.
- To correct a specific shortcoming.

Most MOS TEC lessons available for Stinger are audiovisual; several are audio only. Lessons available in the field cover-

- Weapon operation.
- Stinger crew deployment and tactics.
- Quick-reaction exercises.
- Maintenance.
- IFF programming.

Common subject and MOS TEC lessons are automatically distributed to units when completed or revised. In addition, each audiovisual support center receives copies of the lessons. These are used to replace, by direct exchange, lessons found to be damaged or defective.

How TEC is Used

Each lesson contains lesson administrative instructions (LAI) which provide guidance on how to use the TEC training method to identify and solve training deficiencies. To identify training deficiencies, the trainer is provided with pretests and posttests in the LAI. The soldier's proficiency can be determined by having him take the pretest.

For example, if the soldier passes the test, he does not need the training. On the other hand, if he does not pass it, the lesson is prescribed for training. The posttest is used to determine whether the soldier did learn the lesson; if not, he can repeat the lesson. The TEC lessons are developed to allow the soldier to work on his own time and at his own speed. Material telling how to effectively use TEC lessons is obtained from TEC lesson 920-061-0500-F, Introduction to TEC; and TEC lesson 920-777-0505-A, TEC for Green Tabbers. Also, TC 21-5-3, TEC Management Instruction, contains guidance on how to use the TEC system and develop the unit's support structure for TEC.

Using the Beseler Cue/See

The Beseler Cue/See can be used for training in all aspects of Stinger training. The lesson is presented via a super 8-mm continuous loop video cassette that is synchronized with an audio tape cassette. The lesson is normally presented on a 6-by 8-inch screen on the front of the Beseler Cue/See. However, by opening a small door at the rear of the device, the picture can be projected onto a normal screen or classroom wall for larger groups. The film speed can be adjusted from a single frame to 24 frames per second. Frames may be stopped automatically to allow some action by the student such as reading a procedure from a technical manual or answering a question. The Beseler's light weight and small size allow it to be used almost anywhere.

AIRCRAFT RECOGNITION TRAINING

Aircraft recognition for tactical purposes has become a complex and ever-changing problem. New aircraft and changing aircraft designs have become a continuous factor. Also, some not-so-friendly countries have bought aircraft from friendly countries which may cause these aircraft to become threat aircraft. This ever-changing situation poses a real challenge for those who teach visual aircraft

recognition. Perhaps the biggest problem in recognition has been teaching it in an effective and realistic fashion.

Troops must be trained to be proficient in quick aircraft recognition. Hostile low-flying aircraft may appear suddenly from behind low hills, belts of trees, or haze. High-speed aircraft are difficult to identify. Accurate visual recognition of aircraft is essential to Stinger personnel in making their engagement decision. It is vital that recognition be swift and accurate. Crew members should be experts at recognizing all friendly and potentially hostile aircraft expected to be operating at low altitudes in a specified combat zone. Each crew member should approach 100 percent recognition accuracy with 90 percent being a minimum acceptable level of proficiency.

Practicality dictates that aircraft recognition training be conducted using picture images of the aircraft to be learned. Two basic methods for presenting images to trainees are by use of the Ground Observer Aircraft Recognition (GOAR) Kit and the TEC lessons designed for aircraft recognition. In addition, graphic training aids (GTA), such as printed cards and charts, are useful supplements to GOAR and TEC. Numbers and titles of GTAs currently available, or under production, include-

- 44-2-1 Visual Aircraft Recognition Study Cards.
- 44-2-5 Soviet and Warsaw Pact Forward Area Aircraft.
- 44-2-9 Aircraft Recognition Playing Cards.
- 44-2-7 Military Aircraft Markings You Should Know.
- 44-2-8 Free World Forward Area Aircraft.

Aircraft recognition training is covered in detail in TC 44-30, Aircraft Recognition Training for Ground Observers. This training circular should be used as a guide for planning and conducting aircraft recognition training in Stinger units. The training circular tells instructors how to use the TEC and GOAR methods of instruction as well as the GTAs used with recognition training. It also provides information on how to plan and prepare a training program in this subject. Furthermore, it can be used by those persons who establish training requirements and who evaluate job proficiency of individuals and the combat readiness of Stinger units.

Learning Event 3: MOVING TARGET SIMULATOR (MTS) TRAINING

The Stinger/Redeye MTS M87A1, and THT are used to simulate tactical air defense engagement. The objective of the MTS training is to provide means of training and evaluating the performance of a Stinger gunner under simulated combat con- ditions. The THT provides the means for gunners to practice Stinger engagement procedures, including weapon operation, engagement decisions, and firing. Since it is accomplished without the use of actual aircraft or live Stinger rounds, much of the expense involved with the live tracking and firing is eliminated.

USE OF THE TRACKING HEAD TRAINER IN THE MTS

The THT simulates the operating characteristics of the weapon system from activation to firing. A performance indicator assembly is provided on the device to indicate the status and sequence of operation conducted by the trainee. The firing sequence must be completed within 47 seconds

following activation, which approximates the life of the BCU. Thus, the gunner must operate the THT under the same time constraints of the weapon system.

Electrical Power

Electrical power for the THT is provided through a flexible power cord at the MTS, or a rechargeable battery may be used when the device is used in the field for tracking live aircraft. The power supply or battery must be partially removed and reinserted between engagements to simulate removal of the expended BCU in a tactical system. Following activation of the THT, the performance indicator will indicate when acquisition of IR is achieved. The gunner will also receive an audible time when acquisition is achieved as with the tactical system. Following acquisition and while continuing to track, the gunner must uncage the gyro to permit the THT to automatically track the IR source. The indicator panel indicates when automatic track is attained and the gunner also receives a shift in tone level through the acquisition indicator. The time to proceed with the firing sequence is based on the range ring measurement which determines when the target is within the engagement zone or the effective range of the Stinger weapon system.

MTS Film Reels

The MTS film reels provide information to the instructor which indicates when the respective target is within acquisition range, and at the hold fire, resume fire, or cease fire points of the flight path. These points correspond to the range and flight path for each of the two aircraft classes (jet or prop) taught with the technique of fire. Following determination to fire, the gunner must super elevate and select the proper power sight reticle (left, center, or right) and maintain track of the target. At the time the firing trigger is pulled, an audible beep will indicate successful completion of the engagement. In addition, the panel will indicate all steps were conducted properly. The gunner may reacquire the target and repeat the engagement sequence within the 47-second time period from initial activation.

Visual Indicators

The THT simulates all the functions of the Stinger weapon except the missile launch. In addition, the trainer provides an indication of the correct or incorrect performance of each major event in the engagement sequence. Attached to the aft end of the launch tube is a display box (performance indicator assembly) with 10 visual indicators. Each step of the operating procedure is recorded by a white flag in the appropriate indicator window (Figure 123). The visual indicators function as shown in Figure 124.

FIGURE 123. PERFORMANCE INDICATOR ASSEMBLY.

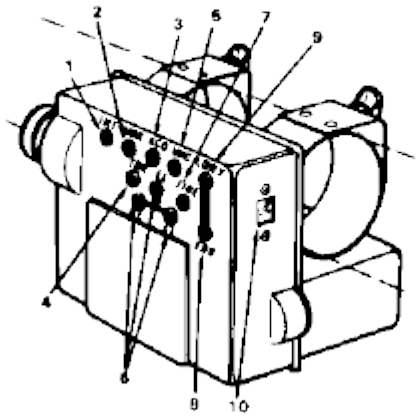


FIGURE 124. VISUAL INDICATORS.

	VISUAL PERFORMANCE INDICATORS		
	ACTION	INDICATOR CHANGE	INDICATION
1 INT	Press IFF interrogate switch	● ➡ ○	IFF switch is pressed
2 UNK	IFF response received	● ➡ ○	Aircraft is unknown
3 ACQ	IR is received by seeker	● ➡ ○	Gunner is tracking target, keeping it in field of view of seeker
4 TRK	Acquire target and press uncaging switch	● ➡ ○	Seeker is locked on and tracking target
5 UNC	Press uncaging switch	● ➡ ○	Gyro uncaged. Missile seeker freed to lock on and track target automatically
	Release uncaging switch	○ ➡ ●	Uncaging switch released
6 LL, RL EL	Apply left or right lead and superelevation	● ➡ ○	Lead and superelevation have been applied
7 FIRE	Press firing trigger	● ➡ ○	Firing trigger is pressed
8 ERR	Gunner made an error	● ➡ ○ Error Tone Sounds	■Pressed firing trigger without. •Acquisition during tracking. •Uncaging. •Superelevation. ■Fired on a friendly target after IFF interrogation. ■Hold firing trigger less than ½ second or released uncaging switch.
9 LOW V	None	● ➡ ○	Voltage too low to operate THT
10 EVENTS COUNTER	Counts number of times gyro spins	3	Number of times safety actuator device is operated

Audible Indicators

The trainer presents audible indications that certain actions in the engagement sequence have, or have not, taken place. The audible indicators include-

- GYRO SPINUP TONE. After the gunner activates the trainer, its seeker gyro starts to spin. The sound it makes can be heard as a low buzz from the acquisition indicators. The sound increases in pitch until full gyro speed is reached.
- IR ACQUISITION TONE. When IR radiations are received by the missile seeker, a tone is generated and can be heard coming from the acquisition indicators. The tone may vary in pitch and amplitude but indicates that the gunner is tracking the target within the field of view of the seeker. When the gunner uncages the seeker and the seeker locks on the target's IR radiations, the tone becomes louder and steadier. This indicates seeker acquisition.
- SINGE PULSE TONE. This tone is heard as a short beep (half-second tone). It indicates a successful launch (simulates that the missile has cleared the launch tube).

  ERROR TONE. If an error occurs, a rising-and-falling (warbling) tone, which is higher pitched than the acquisition tone, is heard. The warbling tone continues until the gunner removes the battery or until power shutdown. An error tone will be heard under the same conditions as explained in the visual indicator (8) (Figure 124).

Error Indications

During the operating sequence, all mistakes can be corrected as long as the firing trigger is not pressed. However, if the firing trigger is pressed, the mistake becomes uncorrectable, as noted by the warbling tone. Uncorrectable errors include the same conditions as explained under visual indictor (8). An example of a correctable error is the loss of IR tone when the UNCAGING switch is pressed. This can occur because the gunner is not tracking smoothly. The gunner can correct this by recaging the gyro and reacquiring the target (Figure 124).

Trainer Timer

The THT has a 47-second timer which simulates the operating life of the BCU. The timer begins running down when the trainer is activated and will shut the trainer down at the end of 47 seconds. If the engagement has not been completed by the time the trainer shuts down, the gunner simulates the removal of a dead BCU and the insertion of a new one (Figure 124).

MTS Target Reels

The MTS projects the images of an aircraft against a natural sky background with aircraft sound effects. Twelve reels of film are used with 20 or 25 target representations per reel. Reels 1 through 10 contain progressively more difficult target presentations. Initial films show slow aircraft moving on a straight and level course. As the trainee becomes more proficient at engaging the aircraft, the target runs courses and maneuvers which tax the gunner's ability to engage the target. Aircraft include friendlies as well as unknowns and must be identified as such. Reels 11 and 12 contain aircraft of all performance categories, and are representative of the variety of targets to be engaged by the tactical Stinger weapon system. A 13th reel to be used for SQT purposes will be released at a later date. The purpose of each reel is as follows:

REEL NO. 1. To familiarize the trainee with the train- ing equipment, method of target presentation, and procedures to be followed during the training period. The first reel also trains the trainee in

determining the proper time to activate, launch, hold fire, and cease fire. Targets fly slow on crossing courses. All aircraft are hostile.

REEL NO. 2. To train the gunner in engagement procedures against targets flying straight and level course. Speeds do not exceed 200 knots. All aircraft are hostile.

REEL NO. 3. To train the gunner in engagement procedures against maneuvering targets. Some crossing targets are less than 1.0 km from the gunners. These close-in targets familiarize the gunner with hold fire procedures for low-speed targets. All aircraft are hostile.

REEL NO. 4. To train the gunner in engagement procedures against maneuvering jet aircraft flying at low speed. One exception is run No. 11 which is nonjet aircraft. Target speeds are less than 300 knots and include target turns of less than 90o. This reel allows the gunner to become familiar with techniques of fire against jet aircraft. The low speeds provide the gunner time to complete the engagement at this early stage of training. All aircraft are hostile.

REEL NO. 5. To train the gunner in engagement procedures against maneuvering high- or low-speed targets. All previously used techniques of fire are used by the gunner in accordance with aircraft class. There are 25 aircraft runs in this reel.

REEL NO. 6. To exercise the gunner on target engagement against maneuvering targets of all classes. Target speeds range from 100 to 450 knots and altitudes from 500 to 6,500 feet. There are 25 aircraft runs in this reel.

REEL NO. 7. To exercise the gunner on target engagement against maneuvering targets of mixed classes. Target speeds vary from 300 to 800 knots and altitudes from O to 6,500 feet. Pop-up attack runs and target maneuvers increasing in difficulty are featured in this reel.

REEL NO. 8. To train the gunner on engagement procedures against maneuvering targets with speeds up to 800 knots. Targets are generally at higher altitudes and a few are at ranges near the outer launch boundary. Gunners are trained to rapidly perform the firing sequence, including IFF procedures, and to determine when to launch and cease fire. The gunner is exercised against a wide variety of attacking aircraft, using ordnance delivery techniques.

REEL NO. 9. To exercise the gunner against high-and low-altitude, high-speed maneuvering targets. Runs include aircraft paths which present relatively high-elevation angles at crossover. The gunner is exercised on his ability to rapidly perform the firing sequence, including emphasis on correct lead angle and determining when to launch and cease fire.

REEL NO. 10. To acquaint the gunner with and provide for practice in the engagement procedures of aircraft performing low-altitude tactical ordnance delivery. Aircraft generally start the run at long range, perform a climb or entry maneuver, and roll over at high altitude prior to the delivery dive. After releasing its ordnance, the aircraft performs a high-speed escape maneuver. Target speeds range from 400 to 800 knots.

REEL NO. 11 AND 12. Targets presented include a selected mix of target runs from reels 1 through 10.

REEL NO. 13. To examine the gunner on previously learned knowledge and skills. This reel will be released at a later date.

MTS OPERATION AND INSTRUCTOR AIDS

A trained instructor operates the MTS console and coordinates the film program (reels) with required training. The instructor should be well versed in all aspects of the MTS M87A1 and THT operation. The instructor should know how to operate the MTS console. Also, he should know how to use the MTS instructor aids to effectively train the Stinger trainees/gunners. However, he is not responsible for the loading of film into the target image projector or operation of the projector. Coordination with the MTS civilian technician is required in advance to allow for scheduling and preparation of equipment. The instructor contacts the MTS technician when he needs assistance or if a malfunction occurs.

LESSON 3 PRACTICAL EXERCISE

Instructions The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

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1. The Stinger platoon's parent unit commander has the authority and responsibility for planning, directing, conducting, and supervising training.

- ○T
- ○F

2. When training both individuals and teams, the commander must ensure that training is performance oriented.

- ○T
- ○F

3. As a commander/future commander/ trainer, you must ask three Questions when making a training program for Stinger crews. Mission/Task, Conditions, and Standards of Performance.

- ○T
- ○F

4. Quick-reaction drills are easy to prepare, can be conducted almost anywhere, and need last only one to two hours per day.

- ○T
- ○F

5. Few methods of training will implant tactical concepts better than a well-conducted-

- ○a.terrain model exercise
- ○b.terrain walk
- ○c.operational orders
- ○d.a and b

6. The Stinger THT has the same general appearance as the weapon-round except for the-

- ○a.IFF interrogator
- ○b.sight assembly
- ○c.performance indicator assembly
- ○d.gripstock assembly

7. The MTS M87A1 provides representative sights and sounds of aircraft expected to be encountered by Stinger gunners.

- ○T
- ○F

8. The MTS is the most effective single training device for training Stinger gunners, but must be supplemented by live-tracking exercises.

- ○T
- ○F

9. The FQM-117A RCMAT is approximately one-fifth the speed and visual size of a full-size threat aircraft.

- ○T
- ○F

10. The performance indicator located on the aft end of the THT has 11 visual indicators.

- ○T
- ○F